February 1, 1961
Vol. 138 No. 3

Journal

OF THE

AMERICAN VETERINARY MEDICAL ASSOCIATION

Special Articles Pertaining to Research Activities

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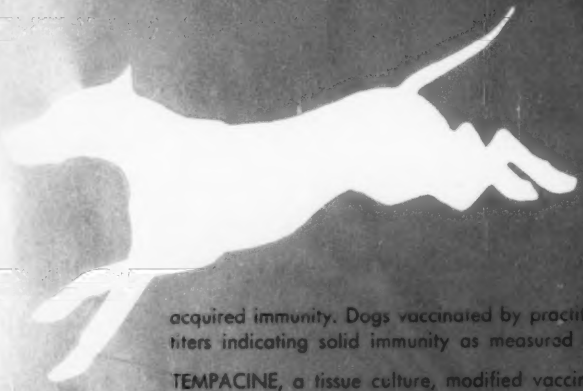

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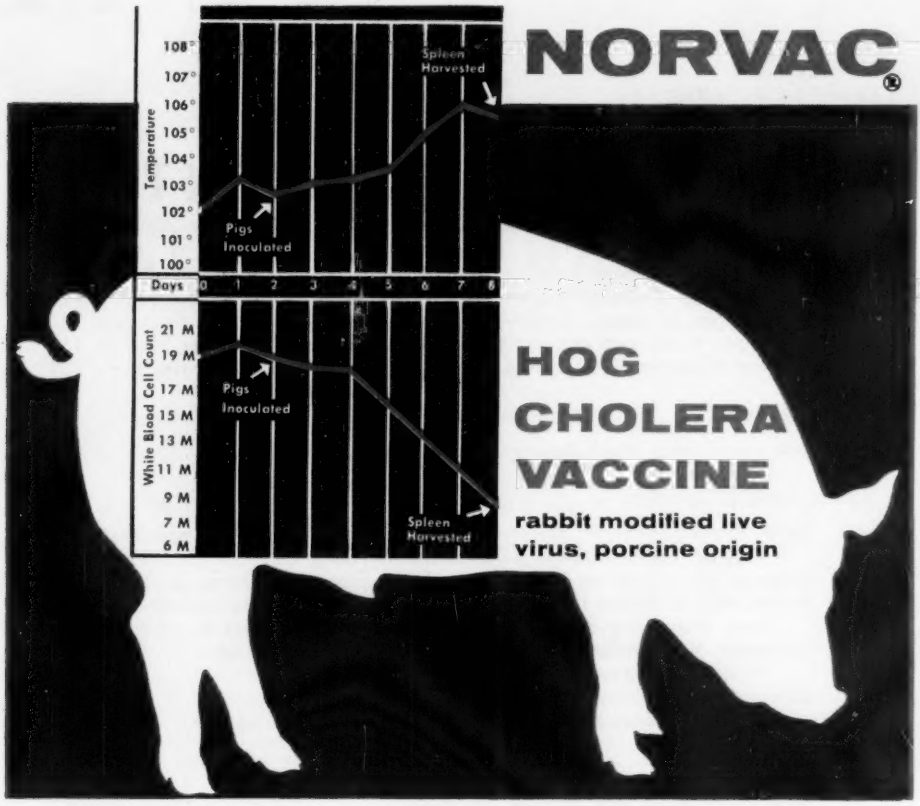

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Journal

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MEDICAL ASSOCIATION

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Correspondence

The Future of the Horse

Dear Sir:

From your special opportunities to observe the tendencies of the times, I would be glad if you would give me your opinion of the future of veterinary medicine. In other words, will it prove an enduring profession in the sense of being a source of revenue to those practicing it. Here in the West, we hear a great deal about the passing of the horse (the most profitable veterinary patient), the automobile, the bicycle and every other device to replace our old friend; but our knowledge of it all comes through the press, as we have never seen the automobile in this part of the country. The special reason that induces me to ask this favor of you is that I have a son who is now about the right age to enter college, and he is very anxious to begin his studies this fall. I should regret to have him spend three years at college and then find out that, like Othello, his occupation was gone.

By giving me your honest opinion, you will greatly oblige,

Yours very truly,
A. B. ————————, V.S.

[Ed Note—We can scarcely find any fault with the anxiety of our Western correspondent, in view of the ridiculous articles with which the daily press is constantly teeming, more particularly the New York *Herald*, whose alien editor is probably a large shareholder in some of the numerous companies capitalized on paper for untold millions for the purpose of either manufacturing the machines or selling the stock. It is passing strange that a newspaper which has in the past received so much from the horse interest of the country should not be able to find a kind word for the soliped in the last year of the nineteenth century.

But there is no more danger of the displacement of the horse than there is of the extermination of man. The world is steadily becoming more populous, and the demands of trade and travel more diversified and exacting, so that new methods are constantly being introduced to meet the requirements of ever-changing conditions. . . . As a pleasure vehicle it may be possible to pass over good roads with speed and comfort in the automobile, but when the novelty wears away it will lack the life, interest, and pleasure of man's best friend.

We advise our Western correspondent, therefore, to pay no heed to the wild vaporings of the stock-kiters and sensation-mongers, but to send his boy to the best veterinary school he may know, to thoroughly equip him for the practice of a profession whose lines are continually being enlarged and where, though spreading to all domestic animals, the horse will ever remain the typical veterinary patient.]

Foregoing correspondence reprinted from the *American Veterinary Review* (Aug., 1899): 318-320.

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-through a nationwide campaign of public education, in farm magazines, newspapers, television, radio

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the educational voice of Associated Veterinary Laboratories

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Map shows location of farm magazines receiving these feature articles.

To tell animal owners the advantages of calling the veterinarian

—to make owners more conscious of disease hazards

—22 national, 60 state and regional farm magazines are now being furnished monthly articles by

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Pitman-Moore and Sioux Falls Divisions

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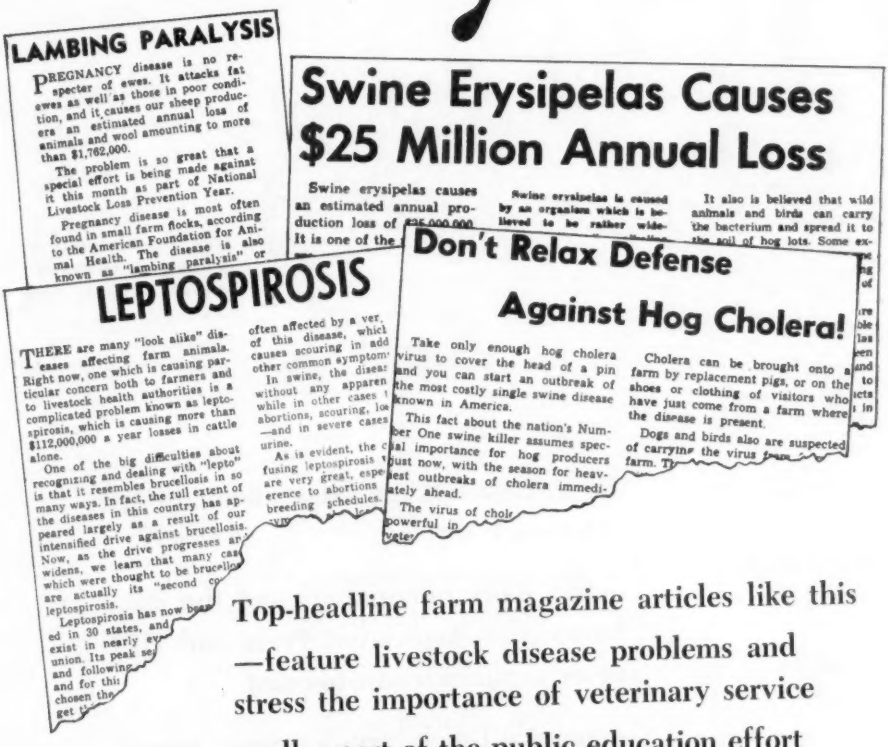

LAMBING PARALYSIS

PREGNANCY disease is no respecter of ewes. It attacks fat ewes as well as those in poor condition, and it causes our sheep producers an estimated annual loss of animals and wool amounting to more than $1,762,000.

The problem is so great that a special effort is being made against it this month as part of National Livestock Loss Prevention Year.

Pregnancy disease is most often found in small farm flocks, according to the American Foundation for Animal Health. The disease is also known as "lambing paralysis" or

Swine Erysipelas Causes $25 Million Annual Loss

Swine erysipelas causes an estimated annual production loss of

It is one of the

Swine erysipelas is caused by an organism which is believed to be rather wide-

It also is believed that wild animals and birds can carry the bacterium and spread it to the soil of hog lots. Some ex-

LEPTOSPIROSIS

THERE are many "look alike" diseases affecting farm animals. Right now, one which is causing particular concern both to farmers and to livestock health authorities is a complicated problem known as leptospirosis, which is causing more than $112,000,000 a year losses in cattle alone.

One of the big difficulties about recognizing and dealing with "lepto" is that it resembles brucellosis in so many ways. In fact, the full extent of the diseases in this country has appeared largely as a result of our intensified drive against brucellosis. Now, as the drive progresses and widens, we learn that many cases which were thought to be brucellosis are actually its "second cousin," leptospirosis.

Leptospirosis has now been found in 30 states, and is believed to exist in nearly every state in the union. Its peak season is in the fall and following the fall rains, and for this reason it has been chosen the

often affected by a ver
of this disease, which
causes scouring in add
other common symptom
In swine, the disease
without any apparen
while in other cases
abortions, scouring, los
—and in severe cases
urine.

As is evident, the c
fusing leptospirosis
are very great, espe
erence to abortions
breeding schedules.

Don't Relax Defense Against Hog Cholera!

Take only enough hog cholera virus to cover the head of a pin and you can start an outbreak of the most costly single swine disease known in America.

This fact about the nation's Number One swine killer assumes special importance for hog producers just now, with the season for heaviest outbreaks of cholera immediately ahead.

The virus of chol
powerful in

Cholera can be brought onto a farm by replacement pigs, or on the shoes or clothing of visitors who have just come from a farm where the disease is present.

Dogs and birds also are suspected of carrying the virus from

Top-headline farm magazine articles like this —feature livestock disease problems and stress the importance of veterinary service —all a part of the public education effort conducted by

American Foundation for Animal Health

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SUPERIOR, NEBRASKA

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Map shows location of newspapers and news bureaus receiving these news releases.

To further tell the facts about modern veterinary service

—681 daily newspapers and the state bureaus of Associated Press and UPI news services, coast-to-coast

—receive timely articles every month in the year from

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EAST ST. LOUIS, ILL.

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Sees Likelihood Of Hog Cholera Epidemic

Livestock authorities are seriously concerned this spring about the possibility of a new wave of hog cholera sweeping the nation's farms.

The disease now costs farmers an estimated $50,000,000 annually. The only safety against cholera lies in protective vaccination before an outbreak starts. There are different types of immunizing agents. Foundation authorities say that determination of which to use depends on the condition of the pigs, their age, local circumstances and other factors, and is best left up to the veterinarian to decide.

In certain areas, some farmers have let down their guard by permitting pigs to go unvaccinated against the disease, according to American Foundation for Animal Health. This may set the stage for fresh outbreaks as the season for heavy cholera losses arrives, says the Foundation.

For this reason, organizations cross the na... to make ... ial April ...

SHIPPING FEVER TAKES TOLL

Farmers at this time of year need to watch out for a fall season "hitch-hiker" which may ride in with the movement of cattle and sheep from the ranges to feed lots, according to a bulletin today by the American Foundation for Animal Health.

Since the disease is infectious newly - arrived feeder stock should be quarantined for a time. 90 animals in the home herd will not be exposed. They should be given quiet surroundings, good shelter, plenty of pure fresh water, and should be fed grass or prairie hay, rather than legumes. If shipping fever develops, veterinarians generally use medical treatments, sometimes with anti-serums. Health authorities recommend that animals be vaccinated against ... as a protective measure ... is stay...

Beware Of Erysipelas In Your Hogs

This spring, farmers need to be more alert than ever against losses caused by swine erysipelas, according to a report issued today by the American Foundation for Animal Health.

Farmers were cautioned to watch for such symptoms as prostration, weakness, loss of appetite, a stiff gait, or a tendency to remain in quarters. A prompt diagnosis is important if an outbreak is to be controlled.

In areas where erysipelas has become a problem, authorities recommend a herd vaccination program. The selection of the program and the type of vaccine to be used should be left to the veterinarian. In buying replacements, farmers should ...

Hidden Killers In Soil Cause Livestock Losses

Hidden killers which live on for years in the soils of pastures and barnyards, are now costing farmers over $20,000,000 a year in livestock losses.

Preventive vaccination can be done against some of these infections, in areas where they are a special problem. Although deaths often occur soon after symptoms develop, a veterinarian can save the animals from certain of the infections; if he can be called in soon enough.

That report, issued by the American Foundation for Animal Health, cautioned animal owners that these diseases organisms ...

News articles like these in animal owners' home town papers

—go to work for the veterinarian, right where it helps most

—furnished the year 'round by

American Foundation for Animal Health

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Map shows location of weekly newspapers and small-town dailies which receive these columns.

Still more grass-roots education of the public on your behalf

—Livestock Health syndicated columns supplied to

—1,452 weekly and small town daily newspapers, 12 months in the year, through

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Fort Dodge Laboratories

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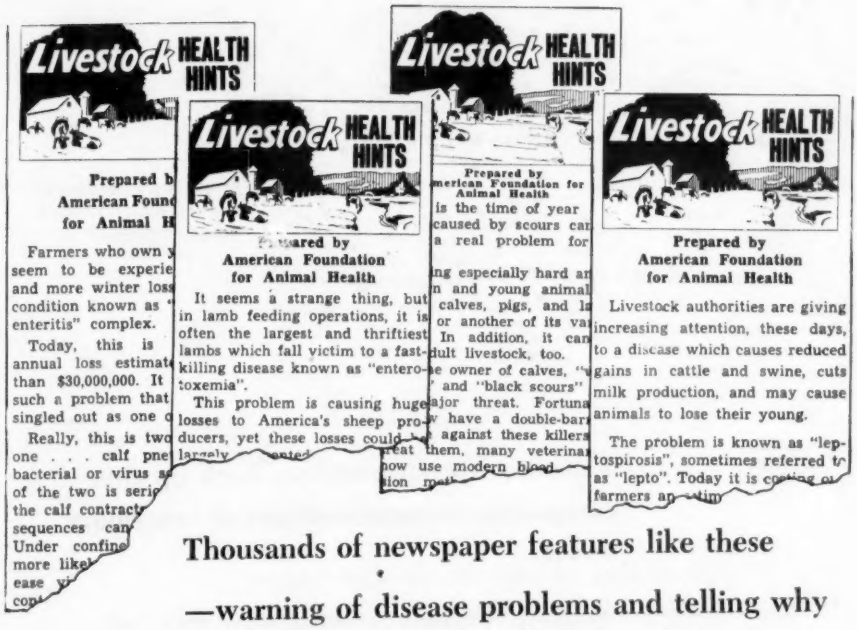
Livestock HEALTH HINTS
Prepared by
American Foundation
for Animal Health
It seems a strange thing, but in lamb feeding operations, it is often the largest and thriftiest lambs which fall victim to a fast-killing disease known as "entero-toxemia".
This problem is causing huge losses to America's sheep producers, yet these losses could
Livestock authorities are giving increasing attention, these days, to a disease which causes reduced gains in cattle and swine, cuts milk production, and may cause animals to lose their young.
The problem is known as "leptospirosis", sometimes referred to as "lepto". Today it is costing

Thousands of newspaper features like these

—warning of disease problems and telling why animal owners should call their veterinarian

—still another step in this nationwide effort by

American Foundation for Animal Health

Grain Belt Supply Co.

SOUTH OMAHA, NEBRASKA

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Map shows location of stations which receive these programs.

Television programs, too, back up this campaign for increased use of veterinary service

—163 television stations now receive monthly program features

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Haver-Lockhart Laboratories

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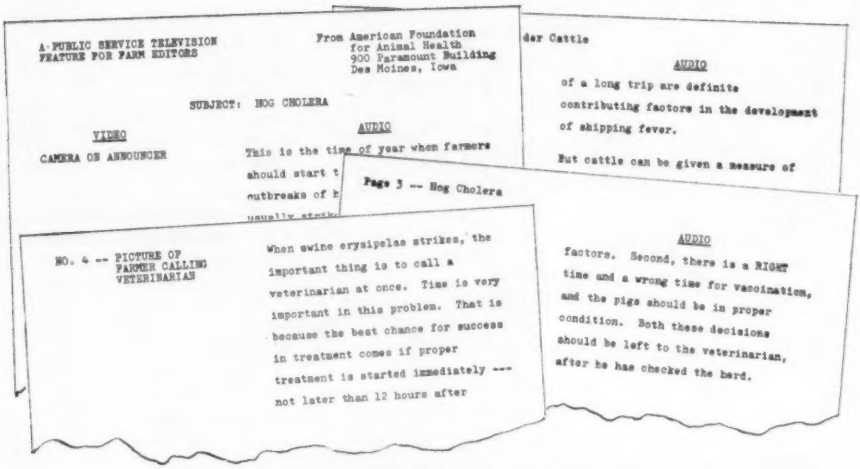
A PUBLIC SERVICE TELEVISION FEATURE FOR FARM EDITORS

From American Foundation for Animal Health 900 Paramount Building Des Moines, Iowa

SUBJECT: HOG CHOLERA

VIDEO

CAMERA ON ANNOUNCER

AUDIO

This is the time of year when farmers should start t... outbreaks of h...

...der Cattle

AUDIO

...of a long trip are definite contributing factors in the development of shipping fever.

But cattle can be given a measure of

Page 3 -- Hog Cholera

NO. 4 -- PICTURE OF FARMER CALLING VETERINARIAN

When swine erysipelas strikes, the important thing is to call a veterinarian at once. Time is very important in this problem. That is because the best chance for success in treatment comes if proper treatment is started immediately --- not later than 12 hours after

AUDIO

factors. Second, there is a RIGHT time and a wrong time for vaccination, and the pigs should be in proper condition. Both these decisions should be left to the veterinarian, after he has checked the herd.

Each monthly TV program stresses current animal disease problems

—and tells the owner to call in his veterinarian for the proper diagnosis and treatment of these problems

—all this sponsored by

American Foundation for Animal Health

Norden Laboratories

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. . . more

Map shows radio stations receiving these animal health bulletins.

National radio coverage, further alerting animal owners to the need for veterinary service

—405 broadcasting stations, covering the entire country

—still another continuing project of

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Southwestern Laboratories, Inc.

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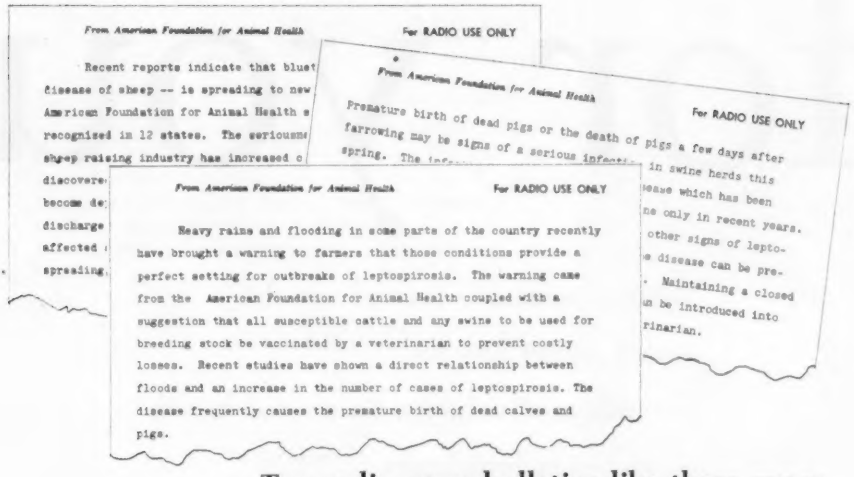
for you



From American Foundation for Animal Health — For RADIO USE ONLY

Recent reports indicate that bluet
disease of sheep -- is spreading to new
American Foundation for Animal Health s
recognized in 12 states. The seriousne
sheep raising industry has increased c
discovere
become de
discharge
affected
spreading

From American Foundation for Animal Health — For RADIO USE ONLY

Premature birth of dead pigs or the death of pigs a few days after farrowing may be signs of a serious infecti
spring. The
in swine herds this
ease which has been
ne only in recent years.
other signs of lepto-
e disease can be pre-
. Maintaining a closed
n be introduced into
rinarian.

From American Foundation for Animal Health — For RADIO USE ONLY

Heavy rains and flooding in some parts of the country recently have brought a warning to farmers that those conditions provide a perfect setting for outbreaks of leptospirosis. The warning came from the American Foundation for Animal Health coupled with a suggestion that all susceptible cattle and any swine to be used for breeding stock be vaccinated by a veterinarian to prevent costly losses. Recent studies have shown a direct relationship between floods and an increase in the number of cases of leptospirosis. The disease frequently causes the premature birth of dead calves and pigs.

Ten radio news bulletins like these every month, nationwide

—warning of timely disease problems and stressing the reasons for calling a veterinarian

—provided to stations by

American Foundation for Animal Health

The Gregory Laboratory, Inc.

WHITE HALL, ILL.

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—newspaper articles

—syndicated columns on animal health

—television broadcasts

—radio broadcasts

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Combats shock and stress
Indicated in shipping fever and pneumonia complications
Valuable in resolving diseases of idiopathic origin

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news from Washington . . .

FROM THE AVMA WASHINGTON OFFICE
J. A. McCallam, VMD
Brig. Gen. USA (Ret.)

Eleven Association Secretaries Contribute to Washington File

As of Dec. 30, 1960, complete or partial information for the legislative file has been received in the AVMA Washington office from the secretary, constituent association of the AVMA, of the following states: Arkansas, Idaho, Maine, Minnesota, Missouri, Montana, Ohio, South Dakota, Tennessee, Vermont, and Virginia. In this connection, refer to memorandum, Nov. 11, 1960.

United States Spends Half a Billion Dollars on Biomedical Research

According to an item in Washington Report on the Medical Sciences (WRMS), Dec. 26, 1960, the United States is spending half a billion dollars on biomedical research. The Senate Committee on Reorganization and International Organizations, under the direction of Julius N. Cahn, has assembled considerable data regarding federal support of and participation in biomedical research. According to WRMS, the wealth of data uncovered should be of great value in charting appropriations, getting a better line on federal aid to teaching institutions, and correcting imbalances in research endeavors. It revealed to what extent departments and agencies are engaged in biomedical studies, and reported that in fiscal year 1959 to 1960, defense spent $48.6 million; AEC $53.2 million; National Science Foundation, $24.4 million; USDA, $16.1 million; Veterans Administration, $17.3 million; Interior Department, $700,000; ICA, $900,000; National Aeronautics and Space Administration, $1.8 million; and PHS (exclusive of NIH), $30.3 million. These total approximately $194 million, compared with $260.7 million expended by NIH for extramural and intramural research. It is expected that Senator Humphrey (D., Minn.) subcommittee chairman, will publish details of the coordination work accomplished under Cahn's direction, in the coming session of Congress.

Report on Subsidy Programs Published

The Joint Congressional Economic Committee has recently published a report entitled "Subsidy and Subsidy-like Programs of the United States Government." The report is described as "a first step in an inquiry into the extent and impact of federal government subsidies, direct and indirect." The document, although taking notice of federal pump-priming in areas as employees health insurance, public health grants to states, etc., devotes considerable attention to agricultural, transportation, and business subsidies.

(Continued on adv. p. 22)

"Sure, everybody calls you 'Doc'. . .

"But being a veterinarian these days has its problems. Your training and experience is valuable, provided, of course, people come to you when they need help. That's the big problem.

"Yes, we still have farmers and stockmen who rely on our professional skill, but you'll find that some of the good people around here have been led to believe that they can diagnose and treat their stock. So, they just go and buy their own supplies and follow their instincts—a dangerous game.

"This do-it-yourself idea is a good money-maker for some of the suppliers, who by-pass our professional counsel and get their products directly into the hands of laymen under special labels and names. 'Doc' is just a polite greeting on the street after this.

"Something is going to have to be done about this situation for the good of the livestock industry and for veterinary medicine. One way, I know, is to purchase your supplies from firms that really mean what they say about selling only to veterinarians."

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Washington News—*Continued*

NIH November Grants Top 18 Million

National Institutes of Health awarded 797 grants and 260 fellowships in November, totaling $18,839,642.

Radiation Research Publication Available

Senate Subcommittee on Reorganization and International Organization, Senator Humphrey, chairman, has recently released a technical publication entitled "Radiation Research in the Life Sciences." It is the tenth in a series by the subcommittee in its international health study, and is a valuable reference of current projects underway in the United States and abroad, including information on organization and distribution of programs. It is available on request to the Subcommittee cited above, Room 162, Old Senate Office Bldg., Washington 25, D.C.

Regulations on Cured Pork Products Revised

USDA, Agricultural Research Service revises regulations governing preparation of smoked hams and other cured pork products (*Federal Register* Dec. 30, 1960). Amendment will permit production and marketing, under federal meat inspection, of some such products with *not more than 10% added* moisture. Still in effect are regulations prohibiting any added moisture in smoked tongues and in smoked or unsmoked cured meats labeled as cooked or ready-to-eat products. The limitation of 8% *added moisture* in canned hams and other pork products also remains unchanged.

Liability Insurance for AVMA Members

The policy, which was developed especially for Association members two decades ago, provides expert defense against claims and suits arising out of the care and treatment of animals, and will pay, to the extent of the policy limits, all expenses and damages resulting from unfavorable verdicts.

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Available with convenient tear-off dispensing label

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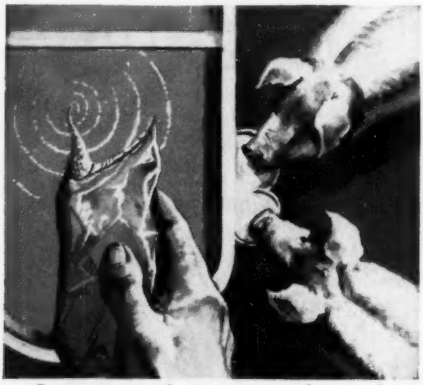
It supplies broad-spectrum effectiveness against diseases caused by gram-negative and gram-positive bacteria, as well as rickettsiae, spirochetes and certain large viruses.

And it is formulated with high levels of 8 important vitamins to help insure adequate vitamin intake during periods of increased stress when:

Animals may be too sick to eat, but are still drinking; the metabolic rate is increased due to infection and fever; diarrhea and vomiting may have reduced nutrient absorption; and when tissue repair calls for increased nutrient supplies.



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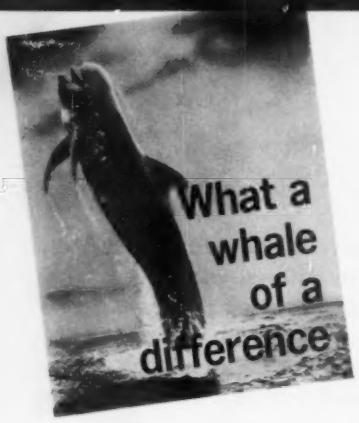

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An aid in the control of scours in calves when attributed to organisms named in the formula.

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*Trademark, Fort Dodge Laboratories

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MEDICAL ASSOCIATION

Comparison of Several Drugs in Treating

Acute Barbiturate Depression

in the Dog. I. Single Drugs

Clyde F. CAIRY, D.V.M., M.S.
Aaron LEASH, D.V.M.
C. S. SISODIA, B.V.SC., A.H.

BECAUSE OF the relative ease with which an excessively deep plane of anesthesia may be induced with barbiturates, antagonists for this type of anesthesia have been sought, studied, and improved. Although respiration may not be the only body function adversely affected by barbiturates, it would seem that an antagonist would not be effective unless it improves ventilation (liters of air inspired or expired per minute). On this basis, improvement in ventilation may be an indicator of efficacy.

This report compares the effects of several drugs on ventilation in dogs anesthetized deeply with pentobarbital sodium.

Methods

Dogs of mixed breeding (7-23 kg.) were given intravenously an anesthetic dose (approximately 30 mg./kg.) of pentobarbital sodium. An endotracheal tube was inserted and connected with a wet-test flowmeter modified in order to record ventilation through a signal magnet. Valves were adjusted to permit inhalation from the room and exhalation through the meter. Ventilation was reduced to 1 to 2 liters per minute by additional small intravenous injections of pentobarbital sodium at about 10-minute intervals. The total amount varied considerably due to the varying conditions of the dogs and other individual differences.

Antidotal drugs were given (table 1). Following administration of antidotes, ventilation was recorded for variable periods up to 70 minutes. In some cases, arousal was sufficient to require removal of the endotracheal tube as early as 15 minutes after giving the drug.

Results

The average increases in ventilation in the surviving dogs are presented based upon percentage increase in ventilation above the predrug level (fig. 1). Actual ventilations before giving the antidotes are shown on the graphs at "zero" minutes.

Typical variations in respiratory responses within a group of dogs are shown (fig. 2, 3, and 4).

Discussion

Caffeine and nikethamide were the least effective of the drugs used in this experiment to increase ventilation in a deeply

From the Physiology and Pharmacology Department (Cairy), the Surgery and Medicine Department (Leash), College of Veterinary Medicine, Michigan State University, East Lansing, and the Mathura Veterinary College (Sisodia), Uttar Pradesh, India.

Part of this work was done in partial fulfillment of the requirements for a M.S. degree in pharmacology at Michigan State University by Dr. Sisodia.

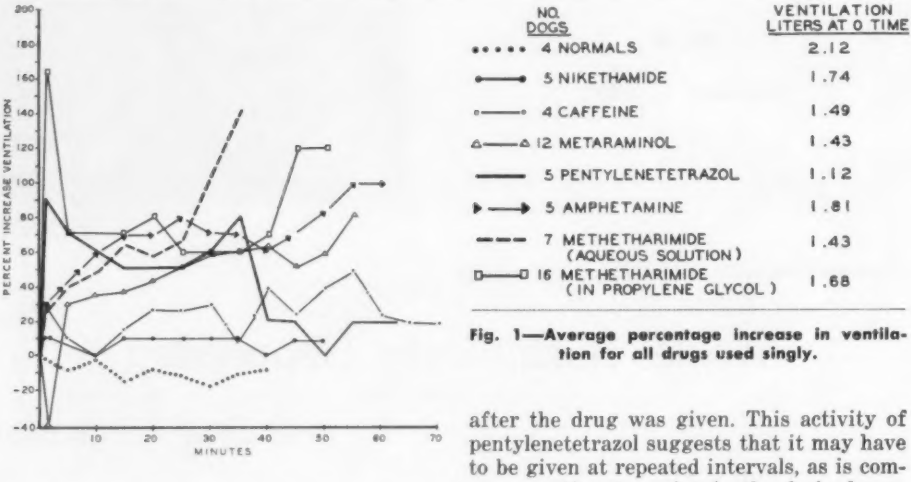

Fig. 1—Average percentage increase in ventilation for all drugs used singly.

anesthetized dog. These results for nikethamide are compatible with the views expressed by another investigator.[1]

The other drugs have individual patterns of response as follows.

Pentylenetetrazol was characterized by a quick increase in ventilation of about 90 per cent, followed by a decrease to 50 per cent, and a second increase to 80 per cent 35 minutes after it was given. Ventilation returned to the predrug level 50 minutes after the drug was given. This activity of pentylenetetrazol suggests that it may have to be given at repeated intervals, as is common practice, to maintain the desired ventilation increase.

With metaraminol bitartrate, there was a preliminary decrease in ventilation, although not a serious one. It was probably produced reflexly by the rise in blood pressure. Following the decrease, an increase in ventilation to about 80 per cent above the beginning level occurred 55 minutes after the drug was given. This respiratory effect is not known to have been reported previously. This drug is a powerful sympathomimetic amine. It may enhance respiration by improving circulation, although many

[1]Jones, L. M.: Veterinary Pharmacology and Therapeutics. Iowa State University Press, Ames, (1957): 206.

TABLE 1—The Number of Dogs Used, the Dose of Pentobarbital Sodium Administered to Produce Deep Anesthesia, and the Amount of Several Antidotes Administered to Improve Breathing Are Shown

No. dogs	Av. wt. (kg.)	No. deaths	Respirations analyzed graphically (No. dogs)	Av. dose and dose ranges of pentobarbital sodium (mg./kg.)	Antidotal drugs	Av. dose and ranges of antidote (mg./kg.)
4	12.0	0	4	34.15 (30.0-38.7)	None	None
6	12.4	1	5	31.93 (22.9-46.2)	Nikethamide*	21.3 (19.2-26.9) (for 4 dogs; 104.0 in 1)
6	18.25	2	4	37.45 (30.0-50.0)	Caffein and sodium benzote*	43.0 (22.7-77.0)
5	14.2	0	5	32.2 (21.7-41.7)	Amphetamine sulfate*	5.02 (4.29-5.55)
6	14.6	1	5	32.6 (22.0-39.0)	Pentylenetetrazol*	8.78 (5.26-14.3)
15	11.9	3	12	37.3 (29.0-50.0)	Metaraminol bitartrate*	0.21 (0.17-0.28)
21	10.75	5	16	43.15 (27.0-71.4)	Methetharimide*	30.0
8	10.1	1	7	42.86 (33.3-51.0)	Methetharimide*	28.7 (20.0-30.0)

*Nikethamide, Coramine, Ciba Pharmaceutical Products, Inc., Summit, N.J., or Nikorine, S. E. Massengill Co., Bristol, Tenn.; caffeine and sodium benzoate, caffeine and sodium benzoate, Physicians Drug and Supply Co., Philadelphia, Pa.; amphetamine sulfate, Amfetasul, Pitman-Moore Co., Indianapolis, Ind., or amphetamine sulfate, Haver-Lockhart Laboratories, Kansas City, Mo.; pentylenetetrazol, Metrazol, Knoll Pharmaceutical Co., Orange, N.J.; metaraminol bitartrate, Aramine, Merck Sharp and Dohme, Philadelphia, Pa.; methetharimide, Mikedimide, Parlam Corp., Englewood, N.J.; and methetharimide, Megimide, Abbott Laboratories, North Chicago, Ill.

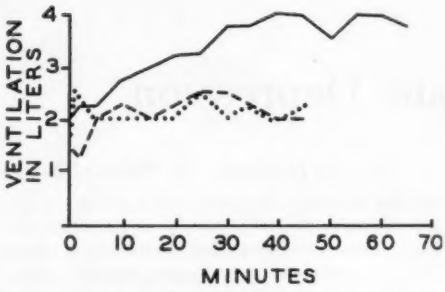

Fig. 2—Changes in ventilation (in liters) in 3 dogs, typical of those given amphetamine sulfate.

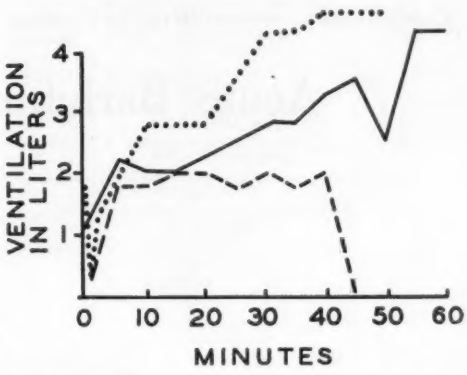

Fig. 3—Changes in ventilation (in liters) in 3 dogs, typical of those given metaraminol bitartrate.

other related compounds (such as epinephrine) do not appear to do this.

With amphetamine sulfate, there was a slow increase in ventilation to a point about 100 per cent above the predrug level 55 minutes after the drug was given. Amphetamine sulfate is not only a medullary stimulant, but a sympathomimetic amine as well. Both of these characteristics are beneficial.

With methetharimide in aqueous solution, there was a slow increase of about 140 per cent 35 minutes after the drug was given. In a propylene glycol base, the pattern was quite different. An immediate increase of 165 per cent occurred, followed quickly by a decrease to the 70 per cent level. This level was maintained for about 35 minutes, at which time a prompt increase to 120 per cent was recorded. The aqueous solution is a 0.5 per cent solution, whereas the propylene glycol base is a 3.0 per cent solution. The higher concentration of the latter may explain the prompt increase in ventilation; it is doubtful that the propylene glycol is responsible.

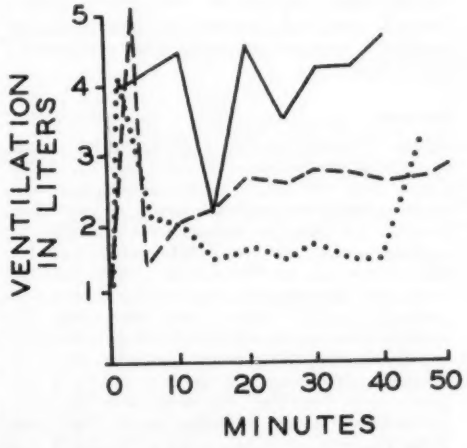

Fig. 4—Changes in ventilation (in liters) in 3 dogs, typical of those given methetharimide in a propylene glycol base.

Summary

Several drugs, used in deeply anesthetized dogs, not only resulted in different amounts of increase in ventilation, but also gave a variety of patterns in these increases. Whereas one drug induced a rapid increase with poor sustaining qualities, another increased the ventilation more gradually and maintained it better. Even the same chemical in different vehicles changed the pattern considerably. These findings suggest that combinations of drugs to increase ventilation may be useful.

In order of increasing effectiveness in increasing ventilation in deeply anesthetized dogs, the drugs, as tested in this experiment, are: (1) nikethamide, (2) caffeine and sodium benzoate, (3) metaraminol bitartrate, (4) pentylenetetrazol, (5) amphetamine sulfate, (6) methetharimide in aqueous solution (0.5%), and (7) methetharimide in propylene glycol (3.0%).

Comparison of Several Drugs in Treating

Acute Barbiturate Depression

in the Dog. II. Pairs of Drugs

Clyde F. CAIRY D.V.M., M.S.
Aaron LEASH, D.V.M.
C. S. SISODIA, B.V.SC., A.H.

RESPIRATORY STIMULANT drugs were found to produce different patterns of respiration (*see* Part I p. 129). As a result, the following 5 antidotal drugs were used in pairs to determine the effects of these various combinations on ventilation: picrotoxin,* pentylenetetrazol,** amphetamine sulfate,† methetharimide,‡ and metaraminol bitartrate.§

Methods

Dogs of mixed breeding (7-17 kg.) were deeply anesthetized as previously described (*see* Part I) to reduce their ventilation. Ventilation changes were recorded. After reducing the volume of respiration to about 1.5 liters per minute, the combination of antidotal drugs was given intravenously, and the effects were recorded for 40 to 60 minutes. Half the therapeutic dose of each drug was used, except in group 11, in which higher doses were given. The drugs in pairs were mixed in the same syringe except in the case of methetharimide. The latter, due to its propylene glycol base, did not mix well, so it was always given first. Then, the second drug was given immediately through the same needle. The drugs tested are listed (table 1).

Results

The average increases in ventilation of the surviving dogs are presented, based upon percentage increase in ventilation above the predrug level (fig. 1). Actual ventilations before the drug injections are shown on the graphs at "liters at 0 time."

Typical variations within a group are shown (fig. 2, 3, and 4).

Results are given when higher doses of the methetharimide-amphetamine combination were used (fig. 5).

Many of the dogs had a slight improvement in ventilation just as the manipulations prior to injection were being made. This was a reflex phenomenon.

In combinations with methetharimide, there were distinct awakening effects, such as return of paw-pinch, corneal, palpebral, and cough reflexes.

Discussion

The combinations are discussed in the order of increasing abilities to improve ventilation.

Picrotoxin-Pentylenetetrazol.—The poor response to this combination is difficult to explain. While picrotoxin may be expected to have a delayed effect, it gave better results when used in other combinations (with methetharimide or amphetamine). Pentylenetetrazol alone gives a desirable ventilation response pattern.[1] However, in this series, it made a poor combination with all drugs except amphetamine. It is possible that picrotoxin and pentylenetetrazol may form a soluble chemical complex which reduces the effect.

Metaraminol Bitartrate-Pentylenetetrazol.—This combination is not highly effective, possibly because the pentylenetetrazol adversely influences the metaraminol effects. The early reduction in ventilation,

From the Physiology and Pharmacology Department (Cairy), the Surgery and Medicine Department (Leash), College of Veterinary Medicine, Michigan State University, East Lansing, and the Mathura Veterinary College (Sisodia), Uttar Pradesh, India.

Part of this work was done in partial fulfillment of the requirements for a M.S. degree in pharmacology at Michigan State University by Dr. Sisodia.

*Picrotoxin, Eli Lilly and Co., Indianapolis, Ind.
**Metrazol, Knoll Pharmaceutical Company, Orange, N.J.
†Racemic, Haver-Lockhart Laboratories, Kansas City, Mo.
‡Mikedimide, Parlam Corp., Englewood, N.J. §Aramine, Merck Sharp and Dohme, Philadelphia, Pa.

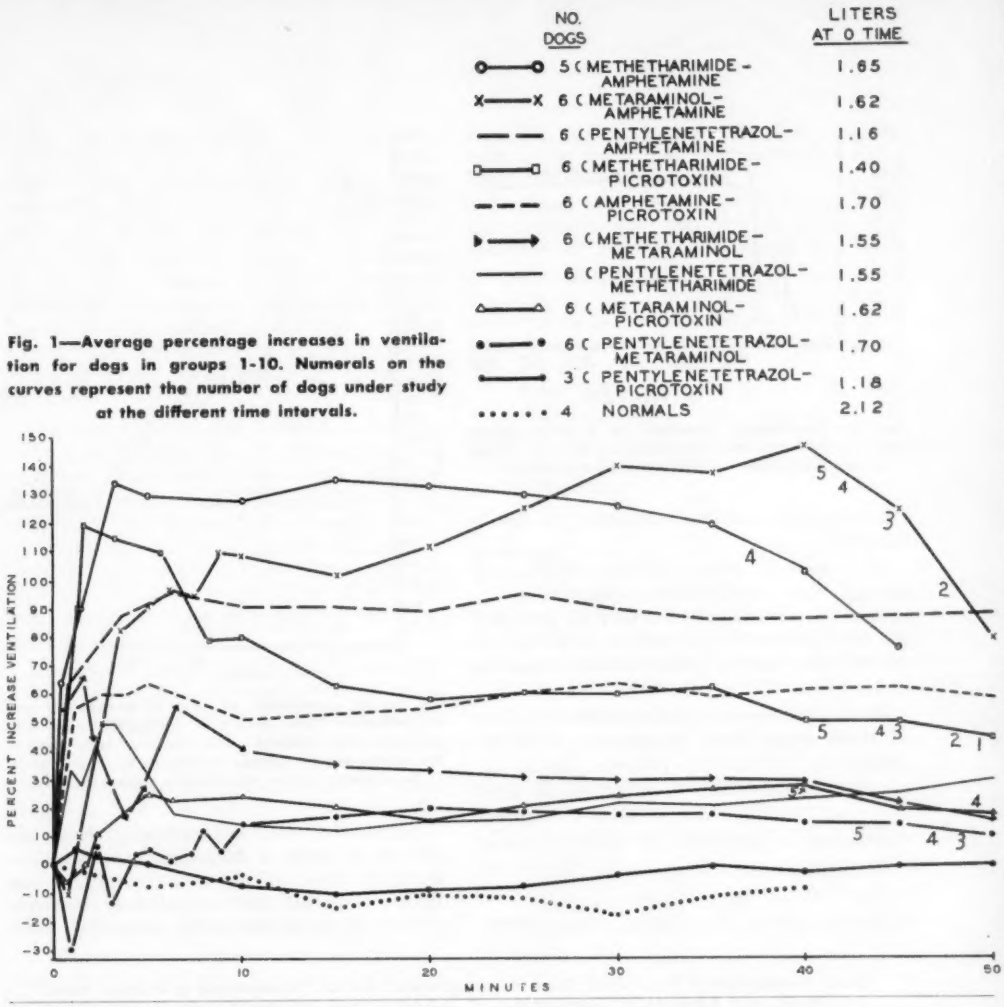
NO. DOGS
LITERS AT 0 TIME
5 METHETHARIMIDE - AMPHETAMINE 1.65
6 METARAMINOL - AMPHETAMINE 1.62
6 PENTYLENETETRAZOL - AMPHETAMINE 1.16
6 METHETHARIMIDE - PICROTOXIN 1.40
6 AMPHETAMINE - PICROTOXIN 1.70
6 METHETHARIMIDE - METARAMINOL 1.55
6 PENTYLENETETRAZOL - METHETHARIMIDE 1.55
6 METARAMINOL - PICROTOXIN 1.62
6 PENTYLENETETRAZOL - METARAMINOL 1.70
3 PENTYLENETETRAZOL - PICROTOXIN 1.18
4 NORMALS 2.12
PERCENT INCREASE VENTILATION
MINUTES

Fig. 1—Average percentage increases in ventilation for dogs in groups 1-10. Numerals on the curves represent the number of dogs under study at the different time intervals.

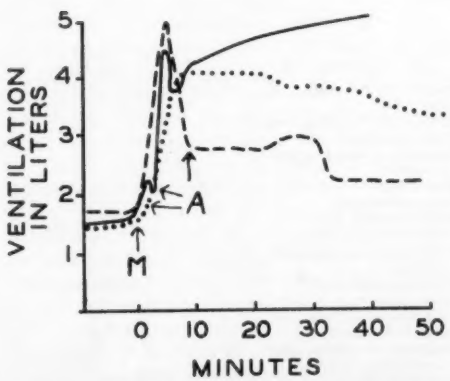

Fig. 2—Ventilation responses in 3 dogs given methetharimide (M) and amphetamine sulfate (A). Times of administration are indicated by the arrows.

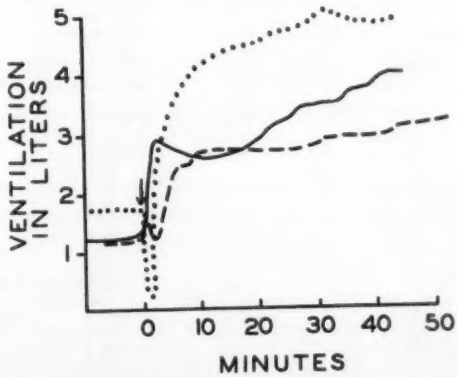

Fig. 3—Ventilation responses in 3 dogs given metaraminol bitartrate and amphetamine sulfate. Time of administration is indicated by the arrow.

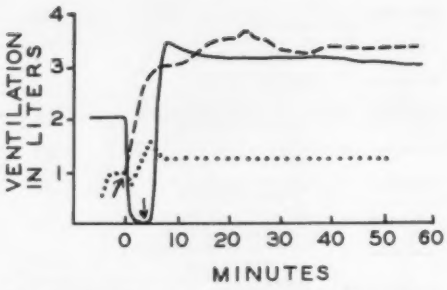

Fig. 4—Ventilation responses in 3 dogs given pentylenetetrazol and amphetamine sulfate. Times of administration are indicated by the arrows.

characteristic of metaraminol, is quite marked.

Metaraminol Bitartrate-Picrotoxin.—Although this combination produces an increase in ventilation of about 25 per cent for 50 minutes, better results would be expected from each of these agents separately.[1]

Methetharimide-Pentylenetetrazol.—Each of these drugs alone caused an initial increase in ventilation followed by a decrease.[1] In combination, this pattern acted similarly, but half doses failed to improve ventilation as much as full doses of either.

Methetharimide-Metaraminol Bitartrate.—Since methetharimide was injected first, a prompt rise in ventilation was expected.

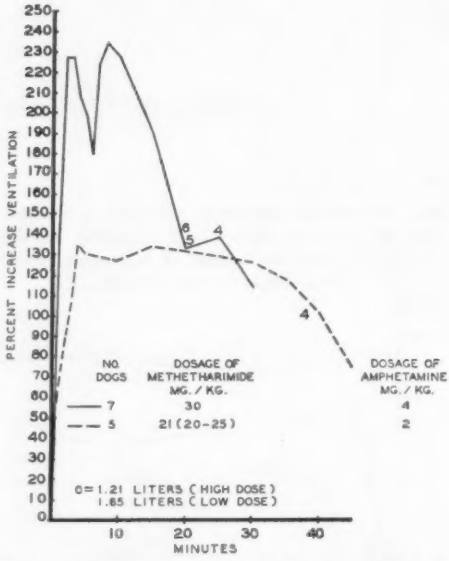

Fig. 5—In comparison of dogs in groups 10 and 11, different dose levels of methetharimide and amphetamine sulfate administered are shown. Numerals on the curves represent the number of dogs under study at different time intervals.

Metaraminol, injected secondly, was expected to cause a decrease in ventilation. Both of these effects occurred. Following these changes, the ventilation increase leveled off at a moderately improved level.

TABLE 1—Number of Dogs Used, Dose of Pentobarbital Sodium Administered to Produce Deep Anesthesia, and Amounts of Combinations of Antidotal Drugs Injected to Improve Breathing Are Shown

Group	No. of dogs	Av. wt. (kg.)	Av. dose and dose ranges of pentobarbital sodium (mg./kg.)	Antidotal drugs	Dose (mg./kg.)
1	3	9.7	42.5(40.0-45.0)	Pentylenetetrazol and picrotoxin	5 1
2	6	14.8	40.0(33.7-50.75)	Metaraminol bitartrate and pentylenetetrazol	0.1 5
3	6	11.9	42.3(40.0-46.5)	Metaraminol bitartrate and picrotoxin	0.1 1.0
4	6	9.0	43.7(40.0-49.0)	Methetharamide and pentylenetetrazol	21.85(20.0-24.5) 5
5	6	10.0	42.3(40.0-45.0)	Methetharamide and metaraminol bitartrate	21.15(20.0-22.5) 0.1
6	6	10.3	45.4(42.5-50.0)	Amphetamine sulfate and picrotoxin	2 1
7	6	11.0	45.1(40.0-64.6)	Methetharamide and picrotoxin	22.5(20.0-32.3) 1
8	6	11.2	42.6(40.0-50.0)	Amphetamine sulfate and pentylenetetrazol	2 5
9	6	13.1	40.3(36.6-45.0)	Amphetamine sulfate and metaraminol bitartrate	2 0.1
10	5	9.6	42.0(40.0-50.0)	Methetharimide and amphetamine sulfate	21.0(20.0-25.0) 2
11	9 (2 died from antidotes)	13.3	41.2(25.7-62.2)	Methetharimide and amphetamine sulfate	30 4

Picrotoxin-Amphetamine Sulfate.—This combination produced a more prompt increase than expected from either drug separately, so there may be some enhancement due to the combination.

Methetharimide-Picrotoxin.—In half doses, this pair produced about the same pattern as methetharimide alone in full doses,[1] except that the initial ventilation increase was not quite as high. The second increase expected from methetharimide alone did not occur.

Pentylenetetrazol-Amphetamine Sulfate.—This combination had the initial response expected from pentylenetetrazol and the sustained effect from amphetamine. The degree of improvement was about 90 per cent and was sustained for 50 minutes; it compares favorably with the peak responses of the individual drugs.[1] Therefore, this combination appears to result in some potentiation of effect.

Metaraminol Bitartrate-Amphetamine Sulfate.—The initial decrease expected from metaraminol was reduced either by using only one half dose or by presence of amphetamine. Thus, this early effect was not synergized, although the effects of these drugs on the rest of the ventilation response pattern resulted in an excellent potentiation, as might be expected from the similarities of these amines. The increase in ventilation was sharper and greater than from full doses of either drug.[1]

Methetharimide-Amphetamine Sulfate.—This combination gave the best results in this experiment. In the ventilation response pattern, there was a quick increase in the methetharimide reaction (almost as high as a full dose alone[1]) and a sustained effect at about the peak level for 30 minutes. This activity contrasts to the decrease if methetharimide is used alone[1] and to the slower increase if amphetamine is used alone.[1]

When higher doses of these stimulants were used (fig. 5), a marked increase (nearly double that of half doses) was produced. However, it was not sustained as long, as far as our results were measurable, because several of the dogs were aroused enough to necessitate removal of the endotracheal tube. Two of 9 dogs treated in this manner died from the analeptics, not from the excessively deep anesthesia. The fact that they awakened, had convulsions, and then died, seems to substantiate this conclusion. One dog, which had the poorest response to this combination, slept (not due to anesthesia) for 2 days and then recovered.

In these experiments, no study was made of cardiovascular changes; however, suggestions of other investigators that barbiturate antagonists should include both respiratory and cardiovascular stimulants is emphasized in our studies. The best combinations in our experience contain a sympathomimetic amine.

Amphetamine appears to be the best drug for combining with other drugs. In order of preference, the others are methetharimide, metaraminol, picrotoxin, and pentylenetetrazol.

Summary

Dogs deeply anesthetized with pentobarbital sodium were treated with one half normal doses of drugs combined in pairs to improve ventilation. Drugs in order of increasing effectiveness are:

1) Picrotoxin-pentylenetetrazol,
2) Metaraminol bitartrate-pentylenetetrazol,
3) Metaraminol bitartrate-picrotoxin,
4) Methetharimide-pentylenetetrazol,
5) Methetharimide-metaraminol bitartrate,
6) Picrotoxin-amphetamine sulfate,
7) Methetharimide-picrotoxin,
8) Pentylenetetrazol-amphetamine sulfate,
9) Metaraminol bitartrate-amphetamine sulfate, and
10) Methetharimide-amphetamine sulfate.

Drugs in 1 group of dogs given higher doses of methetharimide and amphetamine sulfate increased ventilation considerably more than drugs in the half-dose group. Marked arousal was observed in dogs in the former group.

It is suggested that the last 3 combinations may be helpful in treating excessive barbitalization.

References

[1]Cairy, C. F., Leash, A., and Sisodia, C. S.: Comparison of Several Drugs in Treating Acute Barbiturate Depression in the Dog—I. Single Doses. J.A.V.M.A., 138, (Feb. 1, 1961): 129-131.

[2]Weaver, L. C., and Bunde, C. A.: Analeptic-Sympathomimetic Combinations as Barbiturate Antagonists. J.A.V.M.A., 136, (March 15, 1960): 260-263.

Pharyngitis Associated with

Pyometra in a Dog

Robert E. RICHTER, D.V.M.

A FEMALE IRISH SETTER, 11 years old and weighing approximately 60 lb., was brought to me for examination on May 16, 1960, with a history of anorexia and lethargy. Her 7-year-old daughter was admitted at the same time; the daughter had a similar history, but her illness was less severe.

Body temperatures were 101.5 F. and 101.9 F. for mother and daughter, respectively. The owner reported that the dogs had been ill for about 1 week.

Both dogs had slight drainage from the eyes and severe pharyngitis and tonsillitis. The mother had enlargement of the external genitalia, which was associated with her recently completed estrous cycle. Although the pharyngeal mucus was viscous and abundant, neither dog was reported as having vomited, gagged, or coughed. The condition of the stools was unknown but, on examination, diarrhea seemed possible.

Pharyngitis is common in May in this area, and treatment with antibiotics or a combination of sulfonamides has been successful. In these dogs, a combination of 600,000 units of procaine penicillin and 0.5 mg. of dihydrostreptomycin was administered intramuscularly once daily for 3 days. At the end of this period, the daughter was greatly improved, but the mother's condition remained the same. The mother was given triacetyloleandomycin* orally, 250 mg. morning and evening, and the owner was instructed to return her for examination in 3 days.

She was not returned until 5 days later, at which time her temperature remained about 101.5 F., although the pharyngitis was improved. The respiratory rate was increased and slightly labored, and inappetence had recurred. On auscultation of the thoracic areas, no significant cardiac or pulmonary changes were noticed except for an increased heart rate of about 100 contractions per minute. The dog's abdomen had enlarged noticeably, and it was hard and immobile on palpation. The external genitalia had not returned to normal size.

When the vagina was examined, hyperemia and a swollen mucosa covered with a light serosanguineous discharge were found. There was no discharge from the cervix. Catheterization was difficult due to the swollen mucosa, but a urine sample was collected.

It became apparent that an insidious condition, initially masked by the throat infection, had been developing. Heart disease (myocardial congestion) with associated ascites was first suspected; however, on cardiac examination, no evidence of heart disease could be found. Pulmonary congestion was ruled out on the basis of auscultation and absence of febrile reaction. Urinalysis was not indicative of kidney involvement. A variety of cell types in the urine were considered to have resulted from catheterization. A slight albumin reaction was believed to be due to associated discharges.

By process of elimination, pyometra or uterine hyperplasia was suspected. Exploratory surgery was considered inadvisable because of the dog's advanced age and poor condition. Therefore, it was decided to induce estrus with estrogenic hormone therapy. Antibiotic therapy was continued for another 48 hours.

At the end of 48 hours, the dog's condition had deteriorated further, abdominal distention was extreme, and breathing was labored. Vomiting had not occurred, purulent vaginal discharge was not evident, and there was no weight loss. At that time, it was decided to proceed with surgery, with a guarded prognosis.

Preoperatively, the dog was given 50 mg.

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*Cyclamycine, Wyeth Laboratories, Philadelphia, Pa.

of promazine* to relax her. After 1 hour, the abdomen was prepared for a midline incision and pentobarbital sodium was given. Aseptic technique was employed throughout the procedure.

A midline incision, approximately 10 cm. long was made. After the peritoneal incision was completed, a large mass was encountered. It appeared to be uterine tissue, but the length and diameter of the exposed segment caused the surgeon to suspect an impacted bowel such as one might associate with intestinal carcinoma. On elongation of the incision posteriorly, the bifurcation of the uterus was revealed. Except for the bulk which made manipulation difficult, the ovariohysterectomy procedure was routine. All major vessels were ligated; the ovaries, uterus, and most of the cervix were removed. Internal ligatures were made with No. 00 medium chromic gut. A minimum of hemorrhage from vessels in the broad ligament was encountered, but a considerable amount of fluid was trapped in the uterus at the time of removal. Closure of the peritoneum and connective tissue layers was made separately with No. 00 medium chromic gut, and subcuticular sutures (nylon) were used for skin closure. This portion of the procedure was time consuming, and the anethetist infused dextran intravenously and administered prednisolone to combat shock.

On examination of the excised tissue, findings were: bilateral cystic ovaries, indicating that estrus was irregular or absent; a uterine mass with each horn measuring over 60.0 cm. long and up to 7.5 cm. in diameter (fig. 1); approximately 3.4 kg. (7.5 lb.) of involved tissue; and in the endometrial cavity, 1 liter of purulent fluid, the viscosity of which prevented complete drainage.

The patient was slow to recover from anesthesia because of prolonged surgery procedure and shock. The body temperature remained normal. Twelve hours after initial administration, dextran was given along with electrolyte solutions. The next day, the dog walked, ate cooked meat, and had normal bowel and urine eliminations. About 48 hours after surgery, she was no longer in critical condition, and medication was suspended a day later. Since heart and respiratory rates had returned to normal, the dog was released. One month after surgery, she had regained her usual vigor.

*Sparine, Wyeth Laboratories, Philadelphia, Pa.

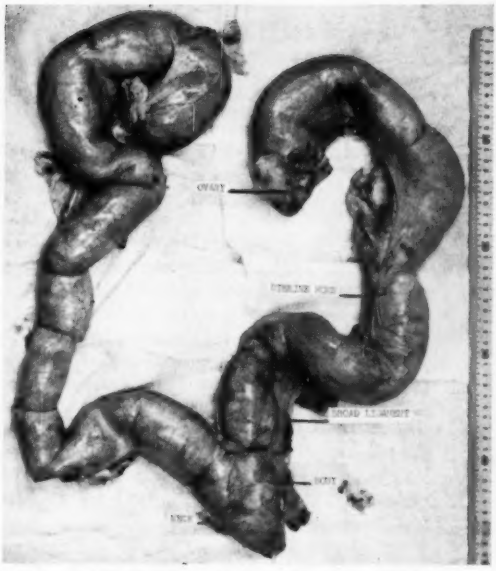

Fig. 1—Enlarged uterus from an 11-year-old Irish Setter with pyometra. Concurrent pharyngitis confused diagnosis.

Summary

An aging female canine patient with a seemingly simple pharyngitis was admitted for medical examination and treatment. The dog failed to respond to treatment for pharyngitis; after 1 week pyometra was diagnosed through more intensive laboratory and physical examinations. Following ovariohysterectomy of markedly enlarged organs, the dog made a complete recovery.

Isolation of *Listeria monocytogenes* from Oat Silage

A culture of *Listeria monocytogenes* was isolated from the brain of an infected sheep from a flock fed contaminated oat silage. Cultures isolated from this silage were all serologic type 4b, establishing a definite epidemiologic relationship.—*Science, 132, (Dec. 9, 1960): 1767.*

Research Is Every Man's Responsibility

Wayne O. KESTER, D.V.M.

WHAT IS the current situation in our profession in respect to research? With increasing interest and support from all directions and the many new facilities recently built, one might assume that our position is excellent. Unfortunately, this is not true. Certainly our profession is in much better shape than ever before, but we are still woefully lacking in the number of doctors of veterinary medicine qualified and motivated to carry on in research. We will continue to be confronted with a shortage for many years.

Why is this true and what can be done about it? This problem, like many others confronting our profession, stems from the shortage of graduates in the 1920's and early 1930's. After World War I and the demise of the horse as an economic factor in practice, many lost confidence in our future and ceased to encourage bright young men to come into our veterinary colleges as students. In fact, many in our ranks actually discouraged young men from studying veterinary medicine.

The results of the shortage were inevitable. Into the vacuum created moved others to engage in poultry practice, artificial insemination, nutritional programs, preventative medicine, and even the vaccination and management of diseased herds and flocks. Hardest hit of all were our research efforts because so few veterinarians became interested in or entered into research.

The upsurge in numbers of veterinary schools and graduates in recent years is overcoming many of the problems created by the "drought" in graduates of the 1920's and 1930's. However, in the field of research, we still have many vacancies.

What can we, as individuals, especially practitioners, do about this? First, we should think, not in terms of creating research projects or doing research but, rather, in terms of developing more veterinarians who are motivated and able to do good research. We must concentrate on training research people rather than on building projects and equipment. When sufficient numbers of motivated and capable people are available, the equipment, projects, and opportunities for research will come easily.

How do we concentrate on developing research workers? Interviews with prospective students indicate that most of them become interested in veterinary medicine through the influence of their hometown practitioners. So it is we, the practitioners, who set the patterns and select the students, whether we realize it or not. A few forward-looking veterinarians assiduously observe the young men in their communities and attempt to encourage those most suited to enter the veterinary medical profession. There is no better way of insuring a bright future for our profession. We all should engage in such practices just as diligently as does a football coach looking for prospective players.

Next, we should understand and discuss the need for research, both among ourselves and with others outside our profession. We should be pointing out the areas in which research should be done. Also, we should understand and point out to future students that many opportunities for training and accomplishments in research do exist. Encouraging prospective students is not a function peculiar to the college staff; we all share and must help in the responsibility of convincing the young student that there are many aspects of veterinary medicine other than practice and that the D.V.M. degree is but a stepping stone, not an end in itself.

Colleges carry a dual responsibility in research—that of training workers and that of conducting research projects to discover

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and make known new information. Too often, we evaluate the success of a college on the basis of how much research and how many papers its staff has turned out, rather than on the basis of how many productive research workers they have developed. The latter is a far better measure of the success and worth of the college in research.

Fortunately, both research and research workers in veterinary medicine are becoming more abundant. Graduate schools at all colleges are expanding materially. Grants and other funds are becoming more plentiful. There seem to be more openings and opportunities in research and postgraduate training than there are applicants. The National Research Council, the Department of Health, Education, and Welfare, USDA, industry, national foundations, and the AVMA are still making increased amounts of money available for veterinary research and training. We all should subscribe to the idea that the most important commodity in veterinary research is personnel and that the biggest contribution we can make toward progress in veterinary medicine is to provide opportunities whereby more students will become introduced to and take part in research. Each of us should have this as an objective.

In review, the greatest deficiency and greatest problem confronting our profession today is in the field of research. The best way to solve this problem and get necessary research done is to concentrate on developing more and better research people rather than more research per se.

Although not many can engage directly in research projects, we all can help locate and encourage good prospects who will engage in research.

Removal of Foreign Object from Lung of a Dog

In June, a 5-year-old, male Pointer was presented for treatment because he had a persistent productive cough. At times, he coughed up blood-tinged mucus. His temperature was normal. The owner stated that several days earlier the dog had run in a field of ripe standing wheat and had been coughing ever since.

Treatment with antibiotics, cough depressants, and expectorants had little effect on the coughing.

Fig. 1—The head of a stalk of wheat and diaphragmatic lobe of the left lung after their removal from a Pointer.

The dog was anesthetized and, on bronchoscopic examination, was found to have inflammation with considerable purulent discharge from the left bronchus. The diagnosis was empyema of the left lung, possibly due to a foreign object. At that time, friction sounds could be detected on auscultation of the left chest wall.

Several days later, a thorocotomy was performed on the dog. The left thorax was entered and an abscessed portion of the diaphragmatic lobe of the left lung was readily visible. The rest of the lung, however, was normal in appearance. The diaphragmatic lobe was removed and the thorax closed.

The head of a stalk of wheat was found in this portion of the

lung. It was 3¼ inches long and approximately the size and shape of a cigarette.

The dog made an uncomplicated recovery and was discharged from the hospital in 2 weeks. Little coughing occurred after surgery was performed.

It is assumed that the dog, running in the wheat field, simply inhaled the head of a stalk of wheat and was unable to expel it by coughing.

This report is presented because of the dearth of literature concerning foreign objects inhaled into a canine lung, the unusually large size of this object, and the successful removal of a lobe of the lung containing the foreign body.—*William M. Burriss, D.V.M., Anderson, S.C.*

Tetanus in Dogs

Three dogs with tetanus were treated in a small animal hospital in Switzerland. The first dog developed localized tetanus in 1 hindleg 6 days after a bite and died on the seventh day of illness. The second dog developed mild generalized tetanus and recovered after 14 days; tetanus organisms were believed to have entered through a small abscess between the toes.

The third dog developed generalized tetanus as a result of a compound fracture of the tibia. The limb was amputated before appearance of clinical signs of tetanus, but the dog died 3 days later. The most striking clinical sign was the narrowed position of the ears, combined with sagittal wrinkles of the forehead. Almost no trismus was observed. Administration of penicillin and antiserum was ineffective, but use of a tranquilizer was helpful. Sodium chloride solution proved to be satisfactory for fluid and electrolytic therapeusis. For artificial feeding, glucose was employed.—*Schweiz. Arch. f. Tierheilk., 10, (Oct., 1960): 559.*

More Veterinarians Needed

In 1960, there were about 12 veterinarians for every 100,000 people in the United States and Canada, and current vacancies for veterinarians are estimated to exceed 2,500.

Considering the present annual number of graduates (826), the annual attrition rate (400), and the annual population increase 3.5 million), the number of graduates produced annually needs to be increased by about 30 per cent if we are only to fill most of the current vacancies and maintain the present ratio of veterinarians to total population—*J. E. Greene, D.V.M., M.S., Auburn University, 74th Annual Meeting of Land-Grant Colleges and State Universities, Nov. 13-16, 1960.*

Swine Repopulation

III. Performance of Primary Specific Pathogen-Free Pigs on Farms

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A PROJECT was begun at the Nebraska Agricultural Experiment Station in 1956 to determine the feasibility and usefulness of completely replacing swine populations on farms, with "disease-free" (specific pathogen-free (SPF) pigs. Reports have already been made of the performance of this type of stock within an experiment station herd,[5] and of the usefulness of boars from such a herd as low-disease risk additions to ordinary farm herds.[2] Details of the methods used were presented in "Swine Repopulation I and II."[2,5] In essence, they are as follows: (1) obtain aseptic pigs; (2) raise pigs in isolation; (3) grow pigs to maturity under farm isolation; (4) resume normal birth and production; and (5) restock other farms with SPF pigs obtained by normal birth and production. All farms are continuously managed to isolate SPF pigs from pigs which have not originated by the preceding methods.

Applications of the method outlined in the preceding paragraph have been less difficult than anticipated. This report presents data on performance of primary SPF stocks on Nebraska farms, indicating the relative ease with which swine repopulation can be successfully applied as a disease control measure.

TABLE 1—Performance of Primary SPF Pigs from Birth to 154 Days

Breed	Litters by hysterectomy av. No.		No. taken to farm	Birth measurements		Av. pig weights (lb.)			Av. daily gain† (lb.)
	Farrowed	Selected*		Length (mm.**)	Av. No. teats	Birth	56 days	154 days	
Primary herd, farm A:									
Y x H	9.4	3.8	19	NT‡	12.9	2.88	31.9	213	1.85
Primary herd, farm C:									
Y	9.5	4.0	8	263	13.8	2.80	26.5	209	1.86
H	9.0	2.0	2	254	11.9	2.60	33.5	201	1.71
B	6.5	4.5	9	241	14.1	2.20	21.6	165	1.46

Breeds—Y=Yorkshire; H=Hampshire; B=Berkshire.
*Number per litter selected for repopulation. Remainder of pigs were utilized in experiments unrelated to repopulation. **Crown-rump length from base of skull to base of tail. †From 56 to 154 days. ‡NT—not taken.

Materials and Methods

DEFINITION OF TERMS

Specific Pathogen-Free.—This term was originated to replace "disease-free" because SPF more precisely defines hysterectomy repopulation pigs or their normally farrowed offspring. Pigs are considered disease-free when they leave the brooder when 4 weeks old. The term "disease-free" was used to distinguish from absolutely "germ-free," since it is recognized that pigs in a farm environment contract a nonpathogenic microflora within a short time. Since it does not reflect an absolute freedom of all diseases in pigs, SPF is a flexible

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Appreciation is expressed to Dr. Oliver D. Grace for his initial work with farm cooperators and to Dr. George W. Kelley, Jr., for his laboratory evaluation of parasitism.

TABLE 2—Prefarrowing Characteristics of Gilts Obtained by Hysterectomy and Raised on Farms A and C

	Farms			
	A	B	C	D
No. of gilts	10	5	6	5
Av. 56-day weights (lb.)	33.9	28.9	26.4	28.2
154-day weights (lb.)	215.0	197.0	206.0	194.0
Rate of gain 56-154 days (lb.)	1.85	1.71	1.84	1.69
Age bred (months)	9.18	8.80	8.87	8.84
No. of live pigs farrowed (1st litters)	12.5	9.8	13.8	10.0

term which can be used to indicate freedom from those troublesome swine diseases which are not a problem in individual pigs or an individual herd of swine.

Primary and Secondary Stock.—"Primary stock" is intended to refer only to those animals taken aseptically by hysterectomy, raised in brooders for 4 weeks, and then placed on farms. "Secondary stock" pertains to the naturally farrowed offspring from primary stock and succeeding generations of SPF stock.

Original SPF Herds

In the spring of 1957, 39 disease-free pigs were taken from brooders in the laboratory and placed on 2 farms in groups of 19 and 20. For convenience, these farms have been designated A and C. Farm A was a large farm with dairy and beef cattle as principal livestock. Pigs had not been raised on this farm for 16 years. Nineteen 1-month-old SPF pigs (Yorkshire-Hampshire) were delivered to this farm in April, 1957. They were placed in 2 large box stalls and fed a complete, commercial, pelleted, starting ration. Alfalfa pasture was utilized after 6 weeks, and a cattle shed was used for shelter.

During November, 1957, the gilts were allotted to 2 separate groups and mated with 2 unrelated boars. The boars had been raised with the gilts until puberty. After all the gilts had become pregnant, 5 of the 15 gilts were moved to another farm (farm B).

Performance data on this stock, raised on farm A from birth to 154 days, are presented (table 1). The 19 pigs were selected from 5 litters which averaged 9.4 pigs per litter. The average 56-day weight was 31.9 lb. These pigs reached 213 lb. by 154 days. No pigs died.

The second farm to receive primary stock directly from the brooders has been designated farm C. Pigs had been raised on this farm up to 1 month before delivery of 20 hysterectomy-derived SPF pigs (Yorkshire, Hampshire, and Berkshire breeds) during the spring of 1957. These SPF pigs were raised on a location on the farm different from that of the previous occupants. One gilt died. On necropsy, there was vegetative endocarditis and ulceration in the gastric mucosa. Erysipelas had been a problem on this farm previously.

The gilts on farm C were allotted to 2 breeding groups and 2 unrelated boars were used to breed the gilts in each group. These boars were among the original 20 SPF pigs. Two months after breeding, 5 of the 11 gilts from farm C were moved to farm D. There had been no pigs on farm D for 6 months prior to delivery of SPF gilts from farm C.

Performance data on stock from farms A and C from birth to 154 days are presented (table 1). The most obvious difference between the performance of farm A and farm C pigs is the slow rate of growth in the Berkshire pigs.

TABLE 3—Performance of Pigs Farrowed Naturally by Gilts Originating from Hysterectomy—Spring and Fall 1958

	Farm A		Farm B		Farm C		Farm D		Av. all
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	farms
No. of litters	10	6**	5	5	6	6	5	5	6
Number pigs born alive	12.2	11.2	9.8	11.8	13.8	12.3	10.0	9.6	11.5
Weaned	11.2	8.0	9.0	6.4	11.3	10.8	9.0	9.4	9.6
56-day:*									
Pig wt. (lb.)	43.0	34.0	49.5	37.6	48.8	41.2	47.5	45.0	43.5
Litter wt. (lb.)	482	272	445	241	551	445	427	423	453
Mortality (%)	8.2	28.6	8.2	40.7	18.0	12.2	10.0	2.1	16.3
154-day:*									
Pig wt. (lb.)	213	181	210	168	233	197	211	221	207
Litter wt. (lb.)	2,386	1,448	1,890	1,075	2,633	2,128	1,899	2,077	1,987
Gain (56 to 154)	1.73	1.30	1.64	1.33	1.88	1.59	1.67	1.80	1.67
Back fat ♀♀ 200 lb.	1.33	1.29	1.33	1.36	1.43	1.68	1.61	1.45	1.42

*All pigs were weighed as near 56 and 154 days as possible. All weights taken other than on days 56 and 154 were adjusted after Lu, K.H.: Adjustment Procedure for Body Weight and Feed Conversion (1955). Unpublished. University of Minnesota.

**Four sows were not bred in time to farrow in a group.

TABLE 4—Performance of Pigs Farrowed Naturally for 4 Successive Litters by Sows Originating from Hysterectomy

	Litters				4-litter av.	
	1	2	3	4	All sows	Top sow
No. of litters	6	6	5	5	5.5	4
No. of pigs:						
Born alive	14.0	12.6	12.2	12.4	12.8	13.7
Weaned	11.6	12.0	11.6	11.8	11.7	12.5
56 days:						
Pig weights (lb.)	49.2	42.1	48.9	50.5	47.6	53.8
Litter weights (lb.)	571	505	567	596	557	672
Mortality (%)	17.1	4.8	4.9	4.8	8.2	9.1
154 days:						
Pig weights (lb.)	232	200	242	198	218	228
Litter weights (lb.)	2,691	2,400	2,807	2,335	2,551	2,850
Gain (56-154 days)*	1.87	1.61	1.74	1.97	1.73	1.78
Back fat ♀♀ (200 lb.)**	1.40	1.68	1.29	1.28	1.41	1.49

*Gain in lb./pig/day. **Only on gilt pigs.

The 26 primary SPF gilts, raised initially on farms A and C and later allotted to 4 groups including farms B and D, farrowed litters in a natural manner in the spring of 1958. Groupings of these gilts and their prefarrowing characteristics are presented (table 2). Gilts on farm A had their litters in farrowing stalls with heat lamps. Gilts on farm B farrowed in pens with heat lamps. Gilts on farm C farrowed in 3 penned houses with guard rails and heat lamps. Gilts on farm D farrowed unattended in March in straw-bedded sheds without guard rails or heat lamps.

All pigs were vaccinated for hog cholera using rabbit origin modified virus vaccine and serum. Primary SPF pigs were vaccinated when 6 to 8 weeks old. No vaccination reactions or losses were encountered.

Results

The performance of the 26 primary SPF gilts and their litters is tabulated (table 3). Performance varied considerably from farm to farm but, from an over-all viewpoint, was good. The poorest performance was from fall litters of sows on farm B. A management error, consisting of farrowing litters in a barn which also housed feeder pigs, appeared largely responsible for this poor performance.

Originally, it was planned to keep primary SPF stock on farms long enough to raise 2 litters and market them. Five of the 6 sows which had farrowed on farm C were retained and sent to another farm (designated farm E). The sixth sow was marketed because of a breed and type difference. Performance data for these 5 sows for their 4 consecutive litters are tabulated (table 4). Their records are outstanding. The average data from the top-performing sow are presented separately to indicate an exceptional capacity to produce litters averaging nearly 1½ tons in weight at 154 days in 4 successive farrowings.

TABLE 5—Performance of Boars Farrowed Naturally by Primary SPF Stock

	Weight in lb.		Rate of gain	Back fat
	56 days	154 days	56-154 days	at 200 lb.
Farm C				
Boar No.				
1	62	291	2.34	1.40
2	51	272	2.26	1.29
3	55	252	2.01	1.38
4	54	239	1.89	1.03
Av.	55.15	263.0	2.12	1.27
Farm E				
Boar No.				
1	64	296	2.37	1.06
2	56	239	1.87	1.05
3	59	245	1.90	0.96
4	54	252	2.02	1.38
5	47	224	1.81	1.13
6	62	252	1.94	1.55
7	57	250	1.97	1.14
8	50	228	1.82	1.18
9	57	298	2.46	1.43
Av.	56.2	254.0	2.02	1.28

The capacity of the male offspring from primary SPF sows to grow is indicated (table 5). Swine repopulation necessitates sources of boars farrowed naturally by SPF stock or primary SPF boars originating from the laboratory. The data indicate that

"on-the-farm" boar testing is feasible. Boars on farm C were tested in individual pens. They had feed efficiencies (*i.e.*, lb. of feed required to produce 1 lb. of gain) of 3.49, 2.79, 3.21, and 2.87 (av. of 3.09). Boar 1 from farm E and boar 2 from farm C were outstanding.

Serums from all primary SPF stock and their secondary SPF offspring were negative when tested for brucellosis and leptospirosis. Lungs and snouts of representative barrows have been examined at slaughter for virus pig pneumonia and atrophic rhinitis, as described previously.[4] Neither of these diseases was evident in any of the herds, although the sows from which the primary SPF stock was obtained came from a herd which had both of these diseases. There has been no evidence of swine dysentery or transmissible gastroenteritis in any of the herds. In general, enteric disturbances have been mild or nonexistent. Erysipelas has been suspected on farms C and E among suckling pigs. Those individuals which had swollen joints and elevated body temperatures were treated with antibiotics. No herd treatment or vaccination was instituted for erysipelas. Herd performance remained high (table 4), although erysipelas contributed to the relatively high suckling pig mortalities in litters of gilts from primary SPF stock on farm A. Erysipelas had been a serious disease on farm E preceding repopulation.

Discussion

For those acquainted with performance records of pigs, the outstanding general performance of SPF gilts and sows is obvious. A definite demonstration of excellence of performance is desirable, but one apparent weakness in the evaluation of performance of SPF pigs is the inability to use direct controls. Ideally, the old diseased herd and the new SPF herd should be evaluated simultaneously in the same environment. This is not possible because diseases would be transmitted back to the SPF stock. Standards of performance, such as weight at given ages, must thus serve as criteria for evaluation between groups of pigs which cannot be placed together.

The 1958 herd analysis of the Wisconsin Swine Selection Cooperative is useful as a standard for comparison of conventional to SPF pigs. It presents results obtained by good swine producers, with 1958 being the best year for swine performance in the 15-year history of the Wisconsin Cooperative. Records on 70 herds, involving 430 litters, indicated an average of 9.5 pigs farrowed alive and 7.6 pigs raised, with 154-day average weights of 155 lb. The total was 1,179 lb. per litter at 154 days, compared with 1,987 lb. per litter for SPF herds.

Although direct comparison of the performance of SPF pigs to ordinary pigs is not possible, indirect comparisons indicate clearly a marked superior performance by SPF pigs. Since the buildings, equipment, feeding practices, and general management have not been markedly changed, reduction in disease intensity on farms through SPF pigs is considered the principal change responsible for increased performance.

Respiratory and enteric diseases have been eliminated from primary SPF pigs up until the time they leave the brooder at 4 weeks. Well-managed SPF herds run a low risk that diseases in these categories will be reintroduced. Two diseases which apparently are easily eliminated and have not recurred in SPF herds are atrophic rhinitis (AR) and virus pig pneumonia (VPP). Elimination of these 2 diseases alone could account for the major part of the superior performance of SPF pigs. Atrophic rhinitis has been reported to cause a 5 per cent reduction in growth rate,[3] and VPP has been reported to slow growth by 17 per cent and lower feed efficiency by 22 per cent.[1]

There is currently no way to estimate what advantages SPF pigs have because of elimination or reduction of enteric diseases. The general observation has been made that SPF pigs have had decidedly less difficulty with diarrheal problems than is generally expected for pigs of suckling age. Eventually, criteria will become available from which an estimate of the relative effect of moderate enteric infections on efficiency of performance in pigs can be made.

One other group of diseases relating to SPF pigs are diseases of the skin. These are eliminated from primary SPF pigs by the repopulation methods used. The SPF pigs are characterized by their excellent skin condition. Evaluation of the extent that skin diseases effect performance is not possible.

Summary

Thirty-nine primary specific pathogen-free (SPF) pigs obtained by hysterectomy were placed on 2 Nebraska farms. Records of performance of the surviving 38 primary SPF pigs indicated a 28.5 lb. average 56-day weight and a 200 lb. 154-day weight. Records of performance have been kept on 58 litters with 579 of the secondary SPF pigs farrowed by these primary stocks, indicating an average 56-day weight of 44.8 lb. and an average 154-day weight of 210 lb. Ten pigs were saved per litter for an average 154-day litter weight of 2,100 lb. All herds have remained free of atrophic rhinitis and virus pig pneumonia.

By November, 1960, the secondary SPF offspring from this stock have been used to repopulate over 100 additional farms.

References

[1]Betts, A. O., Whittleston, P., Beveridge, W. I. B., Taylor, J. H., and Campbell, R. C.: Virus Pneumonia in Pigs: Further Investigations on the Effect of the Disease upon the Growth-Rate and Efficiency of Food Utilization. Vet. Rec., 67, (1955) : 661-665.

[2]Caldwell, J. D., Sumption, L. J., and Young, G. A.: Swine Repopulation. II. Performance of "Disease-Free" Boars on Farms with Diseased Pigs. J.A.V.M.A., 135, (Nov. 15, 1959): 504-505.

[3]Kristjansson, F. K., and Gwatkin, R.: The Effect of Infectious Atrophic Rhinitis on Weight for Age in Swine. Canad. J. Agric. Sci., 35, (1955): 139-142.

[4]Young, G. A., Caldwell, J. D., and Underdahl, N. R.: Relationship of Atrophic Rhinitis and Virus Pig Pneumonia to Growth Rate in Swine. J.A.V.M.A., 134, (March 1, 1959): 231-233.

[5]Young, G. A., Underdahl, N. R., Sumption, L. J., Peo, E. R., Olsen, L. S., Kelley, G. W., Hudman, D. B., Caldwell, J. D., and Adams, C. H.: Swine Repopulation. I. Performance within a "Disease-Free" Experiment Station Herd. J.A.V.M.A., 134, (June 1, 1959): 491-496.

Attempts to Vaccinate Pigs Following Treatment with Anti-Hog Cholera Serum

In experiments at Pennsylvania State University, it was shown that in many instances in which sales barn pigs were susceptible to hog cholera 4 weeks or longer after vaccination with serum and vaccine, the susceptibility could be attributed to previous treatment with serum alone. If serum alone was given 4 days before vaccination, more than half the pigs developed cholera upon challenge with virulent virus 6 weeks later, and as many as 50 per cent died. When pigs were given 2 treatments of serum (as would happen if they passed through 2 sales barns) and then were vaccinated 3, 10, or 20 days later with vaccine alone, more than 85 per cent were susceptible to challenge with virulent virus 8 weeks later and died. When both anti-hog cholera serum and attenuated vaccine were given at the community sale and no previous serum had been injected, an immunity was established which was quite resistant to subsequent exposure to virulent field virus. It is recommended that all community sales regulations require the administration of both vaccine and serum to all swine submitted for sale.—*H. W. Dunne, D.V.M., Ph.D., and M. Alibasoglu, V.M.Dr., Pennsylvania State University, University Park, Pa., annual meeting of the U.S. Livestock San. A., Charleston, W. Va., Oct. 20, 1960.*

Influence of Forages on Mastitis

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Norma A. FRANK, M.S.

THIS REPORT concerns the occurrence of numerous attacks of mastitis in farm herds. These attacks apparently were related to feeding legume-grass forages in the fresh state or as silage. A majority of attacks occurred at a time when cows were in that part of their lactation periods falling between one month postpartum and one month after becoming pregnant again. Staphylococci and Pseudomonas sp. were the mastitis-producing bacteria mainly involved.

Forages containing legumes which have estrogenic properties[12] have been observed to influence the activity of mastitis-producing bacteria in milk samples.[5-7] They also have been observed to stimulate the occurrence of mastitis under some conditions.[8,9] The limited period in a cows' lactation between a month postpartum and a month after becoming pregnant again was the stage of lactation during which occurred more than half of the 500 mastitis attacks that were studied.[4] This also is the time when estrogenic influences originating in the cows' bodies may be expected to be relatively high. Also worthy of consideration was the fact that legume-grass forages were being fed at this time. The mastitis-producing bacteria associated with these attacks were mainly staphylococci and Pseudomonas sp.[4] In the same study, it was also observed that mastitis attacks which occurred during the period from 3 weeks prior to estrus to 3 weeks after estrus had their highest incidence for any 7-day period from postestrus days 3 to 9.[4] A possible relationship between estrus and attacks of mastitis has been previously discussed.[1,10]

Although it has been reported[11] that the estrogenic substance, diethylstilbestrol, is inhibitory to staphylococci and other microorganisms, it was observed that diethylstilbestrol was not inhibitory when the concentration of the hormone was low,[3] *i.e.*, at levels slightly above those found in milk.[2] The growth of hemolytic staphylococci, Pseudomonas sp. and, to some extent, other bacteria was stimulated at these low levels.

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Herds and Procedures

The herds involved in this study produced between 400 and 500 lb. of butterfat per cow per year, and all had been established for many years. They were on highly productive farms which had been heavily manured and fertilized. The forage mixtures were composed of alfalfa, Ladino clover, and various grasses. The milking machines were operated in an approved manner by the owners themselves or by experienced assistants. Quarter milk samples from all cows in each herd were collected and examined for presence of bacteria in a manner similar to that described previously.[9] These collections were made 2 or more times each year, except in one herd. A special effort was made to collect samples when there was increased occurrence of attacks. When possible, milk samples from mastitis-affected quarters were collected before any medication was applied, and the samples were examined bacteriologically. Recurrent attacks were considered as separate attacks only when at least 5 days had elapsed since a previous attack. The information provided on the individual herds is given in the following order: numbers of attacks, forage programs, and mastitis-producing bacteria encountered.

Results

Herd B.—This was a purebred Jersey herd of approximately 40 milking cows. The farm had been owner-operated for 25 years.

A serious mastitis problem was first encountered in June, 1957. During the next 3 months, there were 46 obvious attacks among 16 cows (table 1). The attacks abruptly subsided in September, 1957, but in the following 2 summers, similar conditions existed involving 16 cows in 1958 and 23 in 1959, even though great care had been taken in handling and milking the herd. A summary of the attacks in each month during 3 years indicated that the greatest incidence of mastitis occurred in the months from May to September, with July the peak month (table 1). There were 158 attacks recorded. Of these, 93, or approximately 60.0 per cent, occurred in cows while they were in that period of lactation from a month postpartum to a month after becoming pregnant again.

This herd was pastured on alfalfa, Ladino clover, and grass each year about May 1. Forage crop silage made from this type of pasture was fed throughout the winter and did not appear to stimulate attacks except in one instance. These attacks occurred when some of the crop that had been harvested in early June, 1957, was held over for a long time in the bottom of a silo and not fed until the end of February, 1959. In late March, approximately 4 weeks after it was first fed, and in April, attacks of mastitis again became prevalent (table 1). Harvesting time for this forage occurred just prior to the first serious increase in mastitis attacks in this herd. Grain was fed the year around, and legume-grass hay was provided in addition to silage during the winter months.

Two kinds of mastitis-producing bacteria predominated: hemolytic staphylococci and Pseudomonas sp. Attacks associated with the Pseudomonas organisms were characterized by sudden onset with marked, temporary systemic reactions. Body temperatures rose as high as 106 F., and almost complete inappetence was present for 15 to 30 hours. During routine examinations of the whole herd, the numbers of cows found to be shedding Pseudomonas organisms in their milk samples varied to some extent with the seasons. Shedding was detected in 5 cows in July, 1957, 2 in January, 1958, 4 in July, 1958, 2 in January, 1959, 7 in May, 1959, and only 1 was found to be shedding Pseudomonas organisms in April, 1960.

Herd S.—In this herd of approximately 45 purebred Holstein-Friesian cows, 24 had attacks of mastitis. The owner reported that mastitis had been a serious problem during the summers of 1957 and 1958 and somewhat less of a problem during the winter months. All obvious attacks in 1959 were recorded (table 2). There was a noticeable increase in the number of attacks per month in milking cows beginning in May and a decrease in number to 3 in September. The 3 in September were repetitions of attacks in the same quarters in previous months. There were 42 attacks in the 4 months from May through August, compared with 44 in the remaining 8 months of the year, a period twice as long. Twenty-

TABLE 1—Herd B—Number of Mastitis Attacks per Month for 3 Years and the Number That Occurred in Cows Between a Month After Parturition and a Month After Becoming Pregnant Again

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1957													
No. attacks	....	....	....	....	....	10	20	16	11	5	2	2	66
1 mo. fr.* to 1 mo. preg.**	....	....	....	....	....	6	12	11	5	1	0	0	35
1958													
No. attacks	0	1	0	1	4	4	12	2	2	2	0	0	28
1 mo. fr. to 1 mo. preg.	0	0	0	0	2	4	10	2	1	2	0	0	21
1959													
No. attacks	3	1	3	5	12	20	10	7	2	1	0	0	64
1 mo. fr. to 1 mo. preg.	0	0	1	4	5	13	6	5	2	1	0	0	37
Total attacks	3	2	3	6	16	34	42	25	15	8	2	2	158
Total 1 mo. fresh to 1 mo. pregnant	0	0	1	4	7	23	28	18	8	4	0	0	93

*One month fresh or one month after parturition; **One month after becoming pregnant again.

TABLE 2—Herd S—Number of Mastitis Attacks per Month and the Number That Occurred in Cows Between a Month After Parturition and a Month After Becoming Pregnant Again

	1959											
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Attacks of mastitis	7	4	9	4	14	14	7	7	3	6	6	5	86
1 mo. fresh to 1 mo. pregnant	0	1	6	3	11	7	3	3	3	2	2	0	41

four (57.1%) of the 42 attacks in the 4-month period occurred in cows during the stage of lactation between a month postpartum and a month after becoming pregnant. Most attacks in March and April also occurred in the same stage of lactation. Recurrent attacks occurred in 3 chronically affected cows while they were dried up in March and April, but these were not tabulated because the cows were sold (table 2).

This herd was given grain during the entire year and was fed heavily on forage crop silage in the fall and winter of 1958-1959. On Feb. 20, 1959, corn silage in moderate quantities coupled with an increase in hay was fed instead. The forage crop silage harvested earliest was the last fed. Freshly harvested legume-grass forage was fed beginning May 1, 1959. It was during this month that the marked increase in mastitis attacks began.

Whenever examined, milk samples from untreated mastitic quarters almost invariably contained hemolytic staphylococci. A majority of the quarter milk samples taken in routine examinations of the whole herd also contained these organisms.

Herd T.—In this herd of approximately 50 registered and grade Holstein-Friesians, 23 cows had attacks of mastitis. The period of the year when the mastitis problem was most acute in this herd was in the winter, between December and March (table 3). The owners' records indicated that a period of similar length and severity also had existed in the previous year but had started approximately a month earlier. The periods coincided with the time of extensive breeding activity in the herd, since many cows had freshened in late fall and early winter.

The cows were pastured on legumes and grass in summer and were fed similar forage as silage in the winter months, along with hay and grain. The forage crop silage had been harvested in the first week of June and was relatively high in moisture content. Some ensiled soft corn also had been fed during part of the winter. The bacteria associated with attacks were almost invariably hemolytic staphylococci. Routine samples from the herd also indicated that this infection was present in a majority of the udders. Few other mastitis-producing organisms were isolated.

Herd W.—This herd contained 31 pure-bred Holstein-Friesian cows. It had been established by the present owner 14 years previously, and he cared for it personally. The mastitis problem developed in early June and numerous attacks or recurrent attacks continued to occur all summer until September. There were 14 cows affected, and 8 of these had primary attacks while in the stage of their lactations between a month postpartum and a month after becoming pregnant again. Legume-grass forage formed a major part of the feed. Depending on the season, it was used as pasture, green-chop, silage, or hay. Grain was fed during the entire year. When the

TABLE 3—Herd T—Number of Mastitis Attacks per Month and the Number That Occurred in Cows Between a Month After Parturition and a Month After Becoming Pregnant Again

	1958			1959									
	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Total
Attacks of mastitis	1	1	5	14	11	20	0	0	2	2	0	0	56
1 mo. fresh to 1 mo. pregnant	1	1	3	8	6	7	0	0	0	0	0	0	26

herd was first examined, near the end of July, hemolytic staphylococci were present in milk samples from all affected cows. Chlortetracycline had been added to the grain ration of 8 of the 14 affected cows for a 3-week period in June and July without any apparent benefit being obtained even in those cattle fed twice the dosage recommended by the manufacturer.

Discussion

Mastitis in these cows appeared to result from a combination of circumstances, including their physiologic hormonal states, the forages they were fed, and the species of mastitis-producing bacteria to which they were exposed. The probability of influences on the problem having their origin in the forages and physiologic states of the cow would seem to be well substantiated by the data already presented,[4,8,9] because partial controls on the forage were available and, in some of the herds, the mastitis problems recurred under similar conditions. Presumably, these kinds of mastitis problems occurred only in the presence of mastitis-producing bacteria whose activity could be stimulated by the existence of the hormonal and nutritional conditions mentioned above.

Both the present data and those previously obtained[8,9] indicate that legumes in the fresh state are more likely to stimulate mastitis than silage. Silage, however, apparently has been involved at times, such as in herd B in the early months of 1959 and in herd T when the mastitis problem occurred in the winter. In herd S, the 9 attacks in March occurred when corn silage was substituted for the forage crop silage, which raised the question as to whether a carry-over effect existed from the previously fed silage. The difference between batches of silage probably was a reflection of the stimulating-factor content of the forage crop on the day of harvesting. Since the problem was encountered mainly on farms that had been well-manured and fertilized for years, the question may be raised as to whether this type of farm management encouraged production of estrogenic substances by the plants, whether the manure simply made liberal quantities available to them, or whether both conditions existed.

The predominance of certain herd infections, due particularly to staphylococci and Pseudomonas sp., apparently was influenced by the joint effects of the forages and physiologic states of the cows. The growth of both these organisms was stimulated by low concentrations of the estrogenic substance, diethylstilbestrol.[3]

Some limited efforts are being made to utilize the present findings in mastitis control. These are aimed at removing one or more of the factors involved, *i.e.*, eliminating shedders of Pseudomonas sp., taking advantage of the periods when these are few in number, and avoiding feeding excessive quantities of mastitis-stimulating forages to infected cows while they are in the sensitive stage of lactation.

Recognition of the presence of these factors in herd mastitis problems can be helpful in arriving at prognoses. Furthermore, improper therapeutic credit given to a change in management or milking or to a treatment or feed additive administered just prior to "normal" cessation of the problem may be avoided.

Summary

Periods limited to a few months during which mastitis was prevalent were encountered in 4 dairy herds. Such periods occurred in one of the herds studied for 3 consecutive years during approximately the same months. All were high-producing herds containing between 30 and 50 cows, and approximately half the cows were affected with mastitis each year. These herds were maintained on productive farms which had been well manured and fertilized.

An apparent relationship was observed between mastitis and the feeding of alfalfa, Ladino clover, and grass forages as pasture, in the freshly harvested state, or as silage. Half or more of the affected cows were in the stage of their lactation between a month after parturition and a month after becoming pregnant again. Staphylococci were the predominant organisms involved, but attacks associated with Pseudomonas sp. were numerous in one herd.

It was considered significant that the legumes were of kinds reported to contain estrogenic substances, that the majority of the attacks occurred in cows during the stage of lactation when their estrogenic influences would be expected to be high, and that the infections involved were among those stimulated by minute quantities of an estrogenic compound.

References

[1]Berger, J., and Francis, J.: Mastitis in Practice. I. Epizootiology and Bacteriology. Vet. Rec., 63, (April, 1951): 283.

[2]Bitman, Joel, Wrenn, T. R., and Sykes, J. F.: Estrogen Determination in Blood and Body Fluids of Cattle. 3rd Symposium on Reproduction and Inferility, 1957, (1958): 141-156.

[3]Frank, Norma A., and Pounden, W. D.: The Effect of Diethylstilbestrol and Progesterone on the Growth of Four Mastitis-Producing Bacteria. Am. J. Vet. Res., 22, (Jan., 1961):

[4]Frank, Norma A., and Pounden, W. D.: The Prevalence of Bovine Mastitis in Various Stages of Lactation, J.A.V.M.A., 138, (1961): In press.

[5]Frank, Norma A., Pounden, W. D., Weaver, C. R., and Gilmore, L. O.: Activity in Milk of a Mastitis-Producing Staphylococcus, a Coliform Organism and *Streptococcus agalactiae*. Am. J. Vet. Res., 20, (July, 1959): 736-741.

[6]Pounden, W. D., Frank, Norma A., Brown, R. W., and Scherer, R. K.: The Resistance of Milk Samples to the Activity of *Streptococcus agalactiae* as Affected by Feeding Silage. Am. J. Vet. Res., 17, (April, 1956): 231-234.

[7]Pounden, W. D., Frank, Norma A., and Krauss, W. C.: The Resistance of Milk Samples to the Activity of *Streptococcus agalactiae* as Affected by Pasture. Am. J. Vet. Res., 17, (April, 1956): 227-230.

[8]Pounden, W. D., Frank, Norma A., and Vandersall, J. H.: Further Observations on Mastitis in Cows Fed Legume-Grass Forage as Soilage and as Silage. J.A.V.M.A., 137, (Jan. 15, 1960): 53-57.

[9]Pounden, W. D., Pratt, A. D., Frank, Norma A., and Smith, H. R.: The Incidence of Mastitis in Cows Fed Legume-Grass Mixtures as Fresh Cut Crop and as Silage. J.A.V.M.A., 132, (April 15, 1958): 337-339.

[10]Reece, R. P., and Murphy, J. M.: The Influence of Diethylstilbestrol Dipropionate on the Lactating Mammary Gland of the Cow. J. Dairy Sci., 26, (1943): 748-749.

[11]San Clemente, C. L., and MacKenzie, R. D.: The Bacteriostatic Effect of Diethylstilbestrol. Quart. Bull. Michigan Agric. Exper. Sta., 39, (1957): 438-443.

[12]Stob, M., Walker, B. H., and Andrews, F. N.: Factors Affecting the Estrogenic Content of Alfalfa Silage. J. Dai. Sci., 41, (1958): 438-439.

Urea Fed with Whole Soybeans May Be Toxic to Ruminants

Urea, used extensively in feeds for cattle and sheep as an extender of protein, may be dangerous when used in a premix along with whole, ground soybeans.

Whole soybean seeds are a rich source of the enzyme, urease, which liberates ammonia from urea. Ammonia is readily absorbed from the rumen, and levels of ammonia nitrogen of 2.5 mg./100 ml. of blood may produce ataxia or unsteady gait in steers. Levels of ammonia nitrogen of 4.0 mg./100 ml. of blood may induce alkalosis and death.

When soybeans are extracted with a solvent and subjected to heat, the processed meal will not contain urease because urease is destroyed by heating. Premixes containing starches or other ingredients as a base usually are safe to use because appreciable amounts of ammonia will not be liberated.—*G. K. L. Underbjerg, School of Veterinary Medicine, Kansas State University, Manhattan.*

Myxomatosis Is Enzootic in California

Occurrence of myxoma virus in California brush rabbits, *Sylvilagus bachmani*, lends considerable support to the view that myxomatosis is enzootic in wild rabbits in California. It seems likely that sporadic occurrences of the disease in commercial rabbitries is due to transmission by mosquitoes from the wild rabbit reservoir. This pattern of disease is similar to that found for myxoatosis in South America where the wild reservoir host is the tapeti.—*Nature, 188, (Oct. 1, 1960): 73.*

Transmission of Bovine Leptospirosis

by Coition and Artificial Insemination —A Preliminary Report

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THE ABILITY of the infected bull to transmit leptospirosis by natural service or by artificial insemination has been postulated but not proved.[2] Since the urethra is the common excretory duct for urine and semen, it seemed possible that a bull in the renal carrier stage could contaminate semen sufficiently to infect cows by coition or by artificial breeding. In previous reports, it has been shown that leptospires can withstand freezing[5,7] and are resistant to the concentrations of antibiotics used in semen processing.[1-4] This is a preliminary report of studies undertaken to determine the possible role of the bull in transmission of leptospirosis.

Materials and Methods

The bull used in this experiment was inoculated subcutaneously with *Leptospira pomona*-infected guinea pig blood. Transmission attempts were not made until dark-field examination of urine revealed the presence of leptospires. Collections of semen were made by use of an electric ejaculator. Eight heifers serologically negative to *L. pomona* antigen were used, 4 of which were bred by natural means during estrus and 4 intravaginally exposed with 2 ml. of a suspension containing equal parts semen and buffered saline solution. The artificially inseminated group were exposed 2 to 3 times weekly during the 5-week period of the bull's leptospiruria. Two of the heifers serviced naturally were bred twice during this period and the remaining 2 only once. The heifers were confined in stanchions during the course of the experiment, and rigid sanitary measures were employed to preclude the possibility of transmission by other means. Contact with the bull was limited to that incident to coitus.

Serum leptospiral antibody titers were determined weekly by the modified microscopic agglutination-lysis test.[6]

Urine samples were diluted 1:1 with buffered saline solution before examination under dark-field illumination.

Semen diluted 1:2 with buffered saline solution was centrifuged at 3,000 r.p.m. for 10 minutes, and 1 ml. of the supernatant fluid was injected intraperitoneally into guinea pigs. After 21 days, the kidneys were removed and homogenized in sterile physiologic saline solution. Approximately 0.2 ml. of this suspension was added to 10 ml. of Stuart's medium. Dark-field examinations of the cultures were made 5 days later to confirm the presence of leptospires in the original semen sample.

Results

Two heifers became infected during the course of the experiment. One was bred a single time by natural service, and the other was from the intravaginally inoculated group. Transmission was confirmed by the presence of significant serum antibody titers of 10^{-5} or higher and by the demonstration of leptospires in the urine. Positive kidney cultures from guinea pigs inoculated with diluted semen verified seminal contamination with leptospires.

The 6 remaining heifers remained serologically negative during the course of the experiment.

From the Department of Veterinary Pathology, College of Veterinary Medicine, and Agricultural Experiment Station, Michigan State University, East Lansing. Published with the approval of the director of the station as journal series article No. 2651.

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Discussion

These findings indicate that a bull can be a factor in the transmission of leptospirosis solely by the act of breeding or by artificial insemination.

The fact that 6 heifers did not become infected may indicate a certain degree of resistance to the sexual modes of transmission. There is, undoubtedly, a great variation in the number of leptospires present in the ejaculate of an infected bull, depending to a large extent on how great a degree of urine contamination of the semen has occurred. Although the role of the accessory glands as a habitat for leptospires should not be overlooked, the urine is the most likely source of seminal contamination.

It can be seen that a recently infected bull brought into a susceptible herd could initiate an epizootic of leptospirosis, even though contact were limited to coitus. Semen artificially collected from an infected bull may also serve to transmit the disease. Further studies are needed to develop methods of semen processing which will eliminate the possibility of leptospirosis transmission. Until such methods are developed the detection of carrier bulls remains of utmost importance to bull studs.

Great care should be taken in the selection and maintenance of noninfected bulls in herds and in studs. The need for a sound vaccination program is obvious.

Further evaluation of the significance of the role of the infected bull in transmitting leptospirosis is needed.

Summary

A *Leptospira pomona*-infected bull transmitted leptospirosis to 2 of 8 heifers. One heifer became infected by intravaginal inoculation of diluted semen and the other by a single natural service. Leptospires were isolated from the semen of the infected bull.

References

[1]Alston, J. M., and Broom, J. C.: The Action of Penicillin on Leptospira and on Leptospiral Infections in Guinea Pigs. Brit. Med. J., 2, (1944): 718-719.

[2]Bryan, H. S.: Studies on Leptospirosis in Domestic Animals. IV. Survival of *Leptospira pomona* in Bovine Semen Extender. M.S.U. Vet., 16, (1955): 27-29.

[3]Chang, S. L.: Studies on *Leptospira icterohaemorrhagiae*. II. A Critical Study of the Effect of Penicillin on *Leptospira icterohaemorrhagiae in vitro* and Leptospirosis in Guinea Pigs. J. Clin. Invest., 25, (1946): 752-760.

[4]Hoag, W. G., and Bell, W. B.: Studies on the Action of Streptomycin Upon Five Serotypes of Leptospira Grown in Two Types of Medium. Am. J. Vet. Res., 16, (April, 1955): 251-254.

[5]Jones, R. K.: Study of the Viability of *Leptospira pomona* in Frozen Extended Bovine Semen, J.A.V.M.A., 133, (Aug. 15, 1958): 216-218.

[6]Morse, E. V., and Langham, R. F.: Experimental Leptospirosis. III. Caprine *Leptospira pomona* Infection. Am. J. Vet. Res., 19, (Jan., 1958): 139-144.

[7]Okasiki, W., and Ringen, L. M.: Some Effects of Various Environmental Conditions on the Survival of *Leptospira pomona*. Am. J. Vet. Res., 18, (Jan., 1957): 219-223.

With Cattle, Air Temperature Is Most Important Environmental Factor in Summer

To determine relative importance of variations in air temperature, wind velocity, solar radiation, and vapor pressure in producing changes in rectal temperatures, pulse rates, and respiration rates in cattle, a series of studies were conducted at the Texas Agricultural Experiment Station.

Results indicated that almost as satisfactory an explanation of variations in rectal temperature, respiration rate, and pulse rate can be accomplished with air temperature as the only independent variable as with all 4 environmental variables studied. It may be concluded that, from a practical standpoint, air temperature is the most important environmental variable with respect to summer weather stress in cattle.—*J. Dai. Sci., 43, (Sept., 1960): 1235.*

Cutaneous Streptothricosis in Cattle

Charles H. BRIDGES, D.V.M., PH.D.
William M. ROMANE, D.V.M.

THIS REPORT is concerned with the occurrence in American cattle of a disease similar to cutaneous streptothricosis, or Senkobo skin disease, as seen in cattle of tropical Africa. Cutaneous streptothricosis is reported to be enzootic in Nyasaland,[16] Northern Rhodesia,[7] Nigeria,[9] British West Africa,[4] Kenya,[9] and Belgian Congo[15] and to have been diagnosed in individual herds in Australia[2] and Great Britain.[12] It has not been reported previously in American cattle to the authors' knowledge.

Case Histories

Case 1.—In September, 1959, a 1-year-old, mixed-breed heifer calf from central Texas was admitted to the veterinary clinic at A. & M. College of Texas because of a severe dermatitis which had been evident since the preceding March. The owner reported that he had seen 1 or more cattle with dermatitis in his herd each year for the past few years.

When admitted to the clinic, the calf had a generalized dermatitis with much dry amorphous material matted in the hair over most of the dorsal and lateral parts of its body. Round focal areas of hyperkeratosis, some of which had depressed centers and raised peripheries and measured up to 3 cm. in diameter, were scattered over the body and head. Confluent corrugated masses of keratin covered the skin for several centimeters above the hoofs and the skin adjoining the muzzle (fig. 1). Several ulcers with slightly thickened margins and measuring up to 2 cm. in diameter were present on the dorsum of the tongue and on the dental pad (fig. 2).

Histopathology.—Many narrow (0.4-1.9 μ), branching hyphae were present within the thick layer of keratin which was present on the surface of the skin and in the masses of keratin which plugged the hair follicles (fig. 3 and 4). The hairs were not invaded by the organism. Neutrophils, frequently forming microabscesses, were present in and on the affected keratin and in the dermis where the epithelium was ulcerated. The hyphae did not grow into the epidermis or dermis but frequently appeared in microabscesses in the dermis where the epithelium of hair follicles had undergone necrosis. By Gram's staining technique, many coccoid bodies were found distributed throughout the hyphae, frequently in 2 to several parallel rows (fig. 5). In sections stained by the Gridley fungus technique,[5] thin walls (fig. 6) and numerous septums were evident in the larger hyphae. In some of the broader hyphae, apparently those with the parallel rows of coccoid bodies seen in sections stained by Gram's method, the septums ran longitudinally as well as transversely, making them 2 to several cells wide.

The epithelium around the ulcerated lesions on the tongue was slightly acanthotic. Many cells were hydropic and in some areas several adjacent cells contained 1 to several acidophilic intracytoplasmic inclusions.

Mycology.—Inoculation of material from the cutaneous lesions onto various mediums resulted in the isolation of an aerobic, branching, filamentous organism. By Gram's method of staining, hyphae containing many coccoid bodies, such as those seen in the tissue of the host, were found.

Case 2.—In September, 1952, a biopsy from the skin of a 10-month-old Hereford calf was submitted for histopathologic examination.* On microscopic examination of sections of skin, there was marked hyperkeratosis with an organism morphologically identical to that described in "case 1," growing profusely through the keratin but not affecting the hair. According to the history available, the calf originated in an

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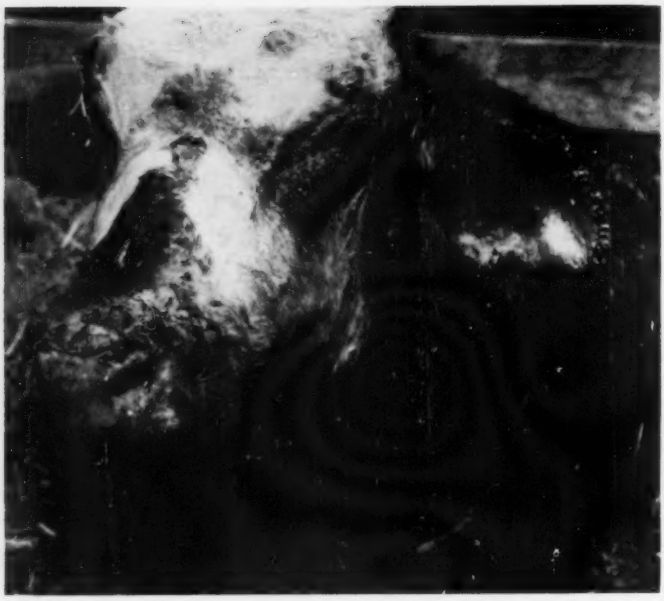

Fig. 1—Focal masses of keratin over nose and between the eyes of a heifer calf with cutaneous streptothricosis (case 1). A more general dermatitis is evident on the ears and eyelids.

Fig. 2—Ulcer on oral mucosa and focal masses of keratin above and behind eye of calf (case 1).

Fig. 3—Hyperkeratosis and acanthosis of epidermis and hair follicles of calf. Microabscesses are visible in the keratin-plugged hair follicles. H & E stain; x 115.

area approximately 100 miles south of the ranch from which the heifer calf in case 1 originated. It was in good condition, had a good appetite, and appeared normal in every respect, except for a dry scaly material over the entire skin surface, the dorsal skin being affected more severely than the rest. In some places, there was marked focal hyperkeratosis which formed masses 7 to 8 mm. thick over the skin. When one of the hard masses was removed, a reddened area remained. Within a few days, the red area dried and another thick layer formed. Data on the presence of other lesions were not available. The calf recovered with the aid of vigorous therapy, including application of a mecuric chloride-salicylic acid ointment and scrubbing with soap and water. No other cattle with such lesions have been seen in this area since this 1 was found.

Discussion

The diagnosis of streptothricosis in cattle is based upon the finding of the characteristic filaments and coccoid elements of *Dermatophilus congolensis* in the exudates and scabs of the cutaneous lesions. The larger hyphae divided first transversely and then longitudinally, producing segments up to 8 cells wide. Parallel rows of coccoid elements were found in the larger hyphae when the exudates were stained by Gram's method. Identification of the organism following its isolation in culture was largely dependent upon its morphologic characteristics.

Similar species of Dermatophilus cause cutaneous streptothricosis in cattle, mycotic dermatitis or lumpy wool, and strawberry foot rot of sheep. Goats, horses, and elands also are affected occasionally by the organism causing streptothricosis in cattle.[1] My-

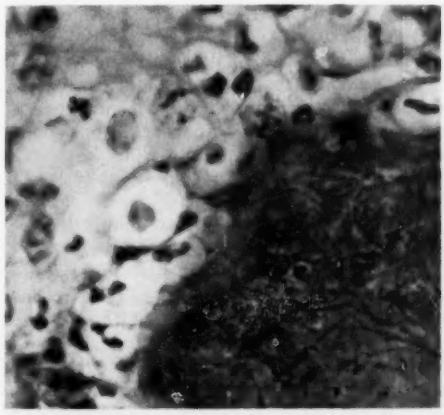

Fig. 4—Branching filaments of Dermatophilus species in mass of keratin in hair follicle. H & E stain; x 665.

Fig. 5—Multiple rows of coccoid elements in hyphae. Gram's stain; x 2,750.

Fig. 6—Branching hyphae with occasional faintly visible longitudinal septums. Gridley fungus stain; x 2,000.

cotic dermatitis (lumpy wool) of sheep also has been diagnosed in the other countries from which cutaneous streptothricosis of cattle has been reported. The biochemical activities of *D. congolensis*, *Dermatophilus dermatonomus*, and *Dermatophilus pedis*, the causes of cutaneous streptothricosis of cattle, mycotic dermatitis, and strawberry foot rot of sheep, respectively, are largely negative.[1] In one study, the main difference found between *D. congolensis and D. dermatonomus* was that the former grew more actively than the latter and retained its viability longer in stored cultures.[11] The ability of the organisms to cause cross infections and similar lesions in both cattle and sheep also attests to their similarity.[3]

The significance of the existence of cutaneous streptothricosis in American cattle remains to be determined. It appears to have been present for at least 7 years, but only a few cases are known to have occurred. A closer examination of other cattle with skin disease now might reveal a greater incidence. Sheep also should be examined closely for such infections.

The epidemiology of this disease is poorly understood. It has been stated that there is general agreement that the disease is not contagious in the ordinary sense.[9] Artificial transmission is difficult, the greatest success being attained when the skin is scarified previous to inoculation or kept damp for several days following inoculation. One investigator[16] noticed that the lesions appeared to occur along the line of skin scratches made by thorns, but the disease has occurred in cattle on pastures with no thorny bushes.[9] It has been reported that the effects of tick infestation and high humidity appeared to be interrelated,[9] and that characteristic lesions of papular stomatitis were present in the mouth of the majority of cattle with cutaneous streptothricosis which were studied by one investigator in northern Nigeria.[10] He reported that the virus of papular stomatitis caused lesions in the skin of the head of some of his experimental calves, in addition to lesions in the mouth, and he considered that this viral disease might be a contributing factor necessary for the establishment of Dermatophilus infection in the skin. Other investigators have suggested that exposure to sunlight and constant wetting by rain are probable associated factors in establishment of natural infections.[1]

It may be significant that there was a marked ulcerative stomatitis with acidophilic intracytoplasmic inclusions characteristic of papular stomatitis in the heifer calf in case 1 described. Also, approximately 2 weeks following admission of this heifer calf to the clinic, a brother of the owner of this heifer brought to the clinic a calf with a similar dermatitis with focal hyperkeratosis and ulcerative stomatitis. Acidophilic intracytoplasmic inclusions similar to those of the heifer calf in case 1 were found in the epithelium of the oral mucosa, but no fungus was present in the cutaneous lesions. Inoculation of a 1-month-old suckling calf with tissues from the latter case has failed to reproduce the lesions to date.

A somewhat similar clinical disease was encountered in a group of calves in central Texas in March, 1960. Acidophilic inclusion bodies similar to those of papular stomatitis and a severe dermatitis with massing of exudates on the skin over much of the body were present. No fungus was found in the skin. The distribution of some of the lesions suggested that photosensitization may have been a contributing factor. This condition is still under investigation. A stomatitis and dermatitis, of cattle of Ruanda-Urundi (Belgian Congo), which is caused by a virus which produces inclusion bodies in the host and in tissue cultures has been described.[13] Papular stomatitis in calves in Ohio has recently been reported.[6] Thus, it is evident that clinically similar diseases, as well as possible contributory diseases, and *D. congolensis* are present in the United States.

There is nothing in the available data to suggest that this disease has been introduced into the United States from other countries. The official report of the United States Livestock Sanitary Association of 1954, entitled "Foreign Diseases, Their Prevention, Diagnosis and Control,"[14] considered that the normal routine examination of animals at ports of entry should be sufficient to pick out an animal with a skin disease like streptothricosis, even though the disease was at first unrecognized. These reporters considered it unlikely that visible evidence would be lacking after a few weeks at sea and a further interval of quarantine in the United States. A logical interpretation would be that the disease occurs infrequently and has not been identified because of inadequate laboratory studies and general lack of information in the American veterinary texts and journals concerning what are considered to be rare and exotic diseases.

Summary

Cutaneous streptothricosis caused by *Dermatophilus congolensis* was diagnosed in 2 calves from 2 separate herds of cattle in central Texas. One calf was first seen in 1952 and represented the only diagnosed case in the herd. The second calf was 1 of several which the owner reported as having the disease in his herd over several years. Further investigations are underway, to determine more about the behavior of this disease in this geographical area.

References

[1]Ainsworth, G. C., and Austwick, P. K. C.: Fungus Diseases of Animals. Commonwealth Agricultural Bureau, Farnham Royal, Bucks, England, 1959.

[2]Albiston, H. E.: Mycotic Dermatitis in a Calf. Austral. Vet. J., 9, (1933): 107.

[3]Austwick, P. K. C.: Cutaneous Streptothricosis, Mycotic Dermatitis and Strawberry Foot Rot and the Genus Dermatophilus Van Saceghem. Vet. Rev. and Annot., 4, (1958): 33-48.

[4]Chodnik, K. S.: Mycotic Dermatitis of Cattle in British West Africa. J. Comp. Path., 66, (1956): 179-186.

[5]Gridley, M. F.: A Stain for Fungi in Tissue Sections. Am. J. Clin. Path., 23, (1953): 303-307.

[6]Griesemer, R. A., Ohio State University, Columbus, Ohio: Personal communication, 1960.

[7]Hudson, J. R.: Cutaneous Streptothricosis. Proc. Royal Soc. Med., 30, (1937): 1457-1460.

[8]Nisbet, D. I., and Bannatyne, C. C.: A Dermatitis of Sheep Associated with an Organism of the Genus Actinomyces. Vet. Rec., 67, (1955): 713-715.

[9]Plowright, W.: Cutaneous Streptothricosis in Cattle. I. Introduction and Epizootiological Features in Nigeria. Vet. Rec., 68, (1956): 350-355.

[10]Plowright, W., and Ferris, R. D.: Papular Stomatitis in Kenya and Nigeria. Vet. Rec., 71, (1959): 718-722.

[11]Snijders, H. S., and Jansen, B. C.: A Comparison of *Streptothrix bovis* and *Actinomyces dermatonomus*. Bull. epiz. Dis. Africa, 3, (1955): 242-243.

[12]Stableforth, A. W.: Cutaneous Streptothricosis, A Case in Great Britain. Proc. Royal Soc. Med., 30, (1937): 1455.

[13]Thienpont, D. H. C., Huygelen, C., Mortelmans, J., Biche, Y., and Pinckers, F.: Existence chez les bovidés du Ruanda-Urundi d'une dermatose infectieuse associeé a'une stomatiti ulcéreuse. Bull. epiz. Dis. Africa, 6, (1958): 295-306.

[14]U.S. Livestock Sanitary Association Official Report. Foreign Animal Diseases, Their Prevention, Diagnosis and Control. U.S. Livestock Sanitary Assoc., 1 West State St., Trenton 8, N. J., 1954.

[15]Van Saceghem, R.: Dermatose Contagieuse (Impétigo Contagieux). Bull. Soc. Pat. exot., 8, (1915): 354-359.

[16]Zlotnik, I.: Cutaneous Streptothricosis in Cattle. Vet. Rec., 67, 1955: 613-614.

Osteomalacia in Horses

II. Nutrition as an Etiologic Factor

Robert E. BARDWELL, D.V.M.

ARTHRITIS OCCURS in horses but, as in man and other animals, is not well understood. The comparative pathologic lesions have been studied[5,7,11,12,17,17a,20,21] by many authorities.

The complexities of equine arthritis have been compared with those of arthritis in cattle, cats, and man. A study of 52 unselected cases of equine degenerative arthritis showed that many findings, previously considered significant, were normal manifestations of peripheral nerve evolvement in horses.[21] The finding of 2 other unidentified peripheral nerve structures[21] indicated the desirability of further study of this aspect of degenerative arthritis.

Pathologic joint changes in the extremities of horses were discussed in detail, and typical lesions of degenerative arthritis were reported in 1 wobbler.[21] However, similar lesions were reported in horses that died from other causes, such as septicemia, torsion of the uterus, ruptured colon, and primary hepatoma. Changes in joints, listed in order of frequency, were synovial fossae, wearing or erosion of cartilage, lipping or osteophyte formation, grooving, and eburnation. These lesions are identical with those which the author has observed in wobblers in this country.

As for the cause of these erosions, some authors do not give a reason for them;[21] others who have examined them in cattle suggest that they occur at the points of greatest wear.[7] They are larger, deeper, and more numerous in cattle than in horses. Still other authors disagree with this and point out that in horses the synovial fossa occurs at the points of least wear and in the more proximal joints, where traumatic shock has largely been dissipated by angulation of the limb.[20]

Wearing is believed by most authorities to be the mildest and most common lesion of joints.[21] Causes of wearing have been listed as (1) intra-articular hemorrhages, (2) "joint mice," (3) villus projections of old age, (4) septic diseases, and (5) deficiency of vitamins and minerals.

Evidence of arthritis has been found by this author in horses of all ages, coordinated or incoordinated, and also in fetuses and stillborn foals. This has been confirmed by necropsies on 4 fetuses ranging from 6 months of development to term.[21] All of them had subchondrial reddening of the head of the radius and ulna, believed to be the first stage of erosion development.[12] It would seem that all horses are predestined to develop synovial fossae in the humeroradial joint.[5,21]

Horses with articular lesions and erosions are often not lame, but the greatest single contributory factor in raising horses that are able to stand the rigors of training and racing is to breed and raise animals that have a minimum number of joint lesions. Although the joint lesions themselves may not affect racing ability, their presence indirectly affects the quality of the soft tissue attachments. Animals that have extensive joint erosions do not have strong ligamentous and tendinous origins and insertions.[4,8,9]

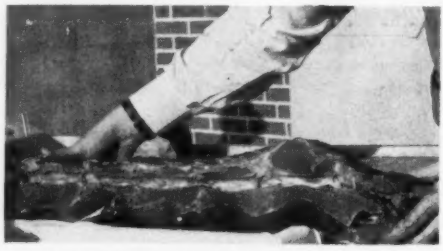

Fig. 1—Photograph of gross specimen from a horse with wobbles. There is no constriction of the spinal cord.

Age is an important factor in the cartilaginous changes seen in animals. Exceptions to the rule that old age and joint changes go together have been explained as probably being due to the type of cartilage inherited. Heredity may determine the time of onset of joint changes, as well as the rapidity with which the lesion progresses.[8] Regression of blood alkaline phosphatase levels at an abnormally rapid rate, due to malnutrition in the young, will also affect cartilaginous changes in horses. There is a direct relationship between serum alkaline phosphatase levels and the capacity of an animal to gain weight. Determination of these levels during the period from birth until training begins, will provide a good index to the type and quality of bone that individual animals possess.[1,3]

In a report on pathologic changes in wobblers, this

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Fig. 2—Photograph of joint lesions in a horse with wobbles.

condition was compared with swingback in lambs in Australia.[16] The study had involved horses with signs typical of wobbles of considerable duration. The syndrome was discussed with veterinarians in Kentucky[4,8] who later sent that author affected animals or refrigerated specimens. Practically all of the specimens sent were sections of the spinal column. Copper deficiency does play a part in the development of wobbles, as it does in swingback. However, the relationship of copper to wobbles is secondary to a primary etiologic agent.

Thirty horses affected with wobbles for varying periods were killed and examined in an attempt to determine the pathogenesis of this disease.[14] Of the 30 horses, 14 had constrictions of the spinal canal similar to those described previously.[10,15] In most animals killed earlier than 1 month after onset of clinical signs, the spinal column was free of lesions. In only 2 of such cases (17 and 21 days' duration) were constrictions of the spinal canal found. These were at the junction of the third and fourth vertebrae. In most cases, the peripheral nerves did not have microscopic lesions. In 2 cases (10 and 12 days' duration), a severe "epineuritis" was observed. Osteoarthritis was found in the cervical and thoracic vertebras. In 16 cases, there were no gross lesions or constrictions of the spinal canal. Lesions of the spinal cord were evident.

It is common practice to euthanatize wobblers to relieve incurable suffering. During the years 1950 to 1956, when he was representing insurance adjustors, the author observed necropsies on more than 150 wobblers, including foals and horses up to 4 years of age. Spinal cord constrictions were not found in more than 15 per cent of these animals. In most, no constriction of the spinal canal was found (fig. 1). Epineuritis of peripheral nerves was not uncommon. Many of these animals were killed 4 to 12 hours after onset of clinical signs. The most consistent findings closely resembled the lesions of joints (fig. 2) described by other authors.[17,21] There were also changes in the viscera similar to those previously described.[14,17,17a,21]

Examination of microscopic sections of the liver failed to reveal any interference with protein metabolism.[19]

The incidence of wobbles is far greater in colts than in fillies, possibly because of the age at which the respective sexes reach puberty.[4,8,9]

Wobblers in Brazil, South America

Wobbles was studied by the author for 12 months, during 1948 to 1950, in Brazil, where the syndrome was found different from that in the United States. There, mares more than 6 years old develop typical signs of wobbles. In the United States, however, this disease is uncommon in adult mares, although it does occur in those 19 to 21 years and older.

During the last quarter of the gestation cycle, the affected mares in Brazil were unnaturally awkward. They sometimes fell down at the time of foaling but never attempted to lie down otherwise. After foal-

ing, the gait improved and, by the time the mare weaned the foal, it was almost normal. If these mares had sufficient nutritional reserves to conceive again that foaling year, their coordination would begin to regress at the middle of the gestation period. These mares, once affected, never completely recovered. Successive pregnancies usually resulted in recurrence of signs of greater intensity and duration. After several successive pregnancies, they became so incoordinated that they were incapable of proper gait in the last stage of gestation. At this point, they either died or were killed. The foals from these mares were not subject to the same syndrome, but had a marked tendency to be unsound on the race track.

In Brazil, it was not unusual for 3 to 10 per cent of the yearling foals to be in various stages of incoordination or "sloppy coordination." Affected animals lay down in the stalls at night but often were able to rise unassisted to only a "sitting dog" position in the morning. When on pasture, normal playful movements were suppressed. They had a pained expression and often would stand in one place for extended periods, shifting their weight from 1 hindleg to the other. Under these conditions, exercise and grazing were limited. The author has not observed this syndrome in the United States.

About the time it was decided to take some definite, corrective measures the animals described began to improve. This was surprising to the author because our literature does not confirm that horses so affected ever improve. No more than 0.5 to 1.0 per cent of these animals were left with a permanent type of incoordination which would be diagnosed as wobbles. If spinal damage, as reported by various authorities, occurs in these animals, it apparently has little effect upon their practical coordination later.

Many horsemen in Brazil have found that, if incoordinated horses are given range for 24 hours a day, they will recover within several months' time. Many such animals have later been raced successfully.

The Role of Vitamins

Some authors concur that the role of vitamin A alone or with other vitamins warrants further investigation.[17,21] Joint lesions were once considered[13] to be the result of vitamin A deficiency, but the authors later corrected this conception and stated that horses can absorb vitamin A much easier than carotene.

A blood chemistry study of 1,806 samples from 84 Hereford heifers during 1948-1953[16] yielded some interesting results. Attempt was made to give the normal ranges of phosphorous, calcium, magnesium, carotene, and vitamin A. A study of the alkaline phosphatase levels of these same cattle would have been most helpful in interpreting the clinical findings.

Where the pastures were not overstocked, there was no evidence of nutritional deficiency, either clinically or as measured by the weights of the cows and their reproductive efficiency. In the fall of 1952, when the average weight of the cows with nursing calves was 1,162 lb. in the lightly grazed pastures and 1,112 lb. in the moderately grazed pastures, the average calving rate in the lightly and moderately grazed pastures was 92 per cent, with calf-weaning weights of 422 to 439 lb. Although cows in the overgrazed pastures had no evidence of specific deficiencies, their average weight in the fall of 1952 was only 1,039 lb., the calving rate, 77 per cent, and the average calf-weaning weight, 372 lb. It was further stated that there were no significant differences in the plasma levels of calcium, magnesium, carotene, and vitamin A among the cattle at the 3 grazing intensities.

The results of the comparison of phosphorous levels in cows in the 3 groups were interesting and unexpected. The averages of the means for 3 years were 4.17 mg./100 ml. for cattle on the heavy grazing intensity lots, 3.38 mg./100 ml. for those on lots with moderate grazing intensity, and 3.64 mg./100 ml. for the cattle in the lightly grazed pastures. The same relative positions of the 3 groups existed for each of the 3 years. Furthermore, the higher plasma phosphorous level in the cattle on the overgrazed pastures occurred in nearly all of 39 samples. In 37 of the 39 samples, the plasma phosphorous was greater in cattle on the overgrazed pastures than in those on moderately grazed pastures; in 32 samples, it was greater than that in cattle at the light grazing intensity. The reason for this was not clear to those authors, but their data gives a reasonable and logical answer. It has nothing to do with calving rates in the heavily grazed pastures, nor

with the phosphorous content of plants. The reason why some persons insist that the bones of large animals have to bend and be malleable before deficiencies exist, and why no attention is ever paid to metabolic interrelations, is not known to this author. While the percentage differences between calcium and phosphorous blood serum levels among the 3 groups are not mathematically significant, they are metabolically significant on the basis of percentage differences.

In man, carotenemia, due to the ingestion of food containing a high concentration of *beta* carotene, is a commonly described disorder. Such disorders have been associated with high serum levels of lycopene.[18] One woman had a total serum protein of 6.70 Gm./100 ml., albumin of 5.40 Gm., and globulin of 1.3 Gm./100 ml. Such a protein serum reading would be most unusual for a horse or cow raised under the nutrient requirements commonly called balanced or sufficient. However, as pointed out later, this condition can occur in horses raised under certain standards of nutrition.

Man assimilates and converts into vitamin A no more than 30 to 50 per cent of his total carotene intake.[5] The present author doubts that the horse is as efficient in this conversion process because, once horses or cattle have become adjusted to a carotene-deficient diet, it takes 3 to 5 years for them to overcome this deficiency. Tremendous ingestion of carotene and carotenoids is required over extended periods to affect metabolic interrelations and storage. This cannot obtain under ordinary pasture conditions because carotene is present in large amounts in pasture grasses only during short periods of the year. Utilization, assimilation, and storage must be effected during this period.

Many factors influence the utilization of carotene. Mineral oil can seriously affect its assimilation, as can certain viruses, bacteria, fungi and parasites to which both young and old horses are frequently exposed.

Discussion

In horses that have incoordination, joint lesions are far more common than are spinal canal constrictions and spinal cord degenerations.[3,14,17,17a,21] Practitioners dealing with new problems associated with racing soundness in horses appreciate that nerve involvement is a constant factor in these horses. Peripheral nerve involvement occurs in wobblers and seldom lasts more than 15 days. Horses in which there have been signs of the disease for more than 30 days often have spinal canal constrictions and spinal cord degeneration. These can be the result of mechanical trauma. Pathologists find some degree of spinal cord degeneration in all cases of incoordination in the horse. From a practical standpoint, this cannot have much significance, or recovery would seldom or never be possible.

Horses sometimes make uncomplicated recoveries from wobbles when given unlimited access to pasture.

Fracture of both fibulae are common in incoordinated animals. These fractures will usually heal without assistance and will prolong the time of complete recovery. They may be caused by lack of control of movements of the animals. The similiar appearances of most right and left fibulae may confuse the diagnosis of lameness in horses by radiographic examination. Aberrations of the fibula other than a fracture line do exist.[2] This author has noticed that the line of fracture in the affected animals will disappear, as shown by subsequent radiographic examinations, provided the animal responds to therapy for wobbles.

The soil type in Brazil is similar to that in Florida, due to deposits from the Amazon River and Gulf currents, respectively. However, because of soil fertility, the quality of oats fed to horses in Brazil is superior to that fed in this country. Although horses there are not given sufficient cured hay, the ration is usually supplemented with complex vitamin-mineral formulations. Pasture grasses in Brazil are not palatable and grow to great heights during the rainy seasons.

Joint lesions in fetuses, stillborn foals, weanlings, yearlings, and brood mares are common in both countries, regardless of the cause of death. While this author has never observed joint mice in Thoroughbred horses, they are seen frequently in the draft-type animals. Intra-articular hemorrhages do occur. Since joint lesions are

common in horses that are not lame, they may not affect racing ability directly. However, it is felt that these lesions indirectly place stress and strain on ligaments and tendons that are susceptible to shock and trauma.

It is difficult for practical horsemen and veterinarians to realize that the ration of the modern horse may be vitamin A deficient, but many reasons could be given. Neither is it appreciated that horses cannot be fed vitamin A effectively. In studies of equine metabolic interrelations, it will become increasingly apparent that the only vitamin A useful to the horse is that which he provides for himself through the normal processes of assimilation and conversion.

Summary and Conclusions

1) Spinal canal constrictions and spinal cord degeneration are most common in wobblers which have been affected for long periods. They seldom occur at the onset of the disease.

2) In Brazil and the United States, the most common necropsy findings in wobblers are joint lesions.

3) Joint lesions are common in wobbles, but they are also found at necropsy in animals with other diseases and have little or no significance. Synovial fossae, erosion of cartilage, lipping or osteophyte formation, grooving, and eburnation can be found in fetuses and horses of all ages and are believed by this author to be due to malnutrition and wearing.

4) In South America, where the incidence of wobblers or of yearlings with "sloppy coordination" is much greater than in the United States, recoveries occur without treatment, usually within 6 weeks. Thus, it would seem that permanent spinal cord damage does not occur.

5) Other than parasites, fewer abnormalities were found in viscera of horses with wobbles. Liver lesions were not seen. Hepatic parenchymal cells contained basophilic granules related to protein synthesis, but it was not possible, from histologic examination, to learn the kind and amount of protein being produced.

6) Horses can make uncomplicated recoveries from wobbles when given unlimited access to pasture.

7) It is believed by some that a deficiency of vitamin A plays a part in the formation of the lesions associated with wobbles. Others believe that horses can assimilate vitamin A more easily than carotene. However, large oral dosages of vitamin A suppress serum carotene levels.

8) Man can assimilate and convert 30 to 50 per cent of his total carotene intake into vitamin A. Conversion in the horse may not be so efficient.

References

[1]Anon.: West. Livestock J., 37, (1959): 47-50.

[2]Banks, W. C., and Schulz, C. W.: Additional Studies of Fibular Defects in Horses. J.A.V.M.A., 133, (Oct. 15, 1958): 422-424.

[3]Bardwell, R. E.: Blood Serum Data on Special Equine Carotenes. Unpublished data, Lexington, Ky., 1957.

[4]Bardwell, R. H., Paris, Ky.: Personal communication, February, 1944.

[5]Bauer, Walter: Diagnosis of Various Arthritides. New England J. Med., 221, (1941): 524.

[6]Best, C. H., and Taylor, N. B.: The Physiological Basis of Medical Practice. 4th ed. Williams and Wilkins Co., Baltimore (1955): 745.

[7]Buerki: Die Synovialgruben des Rindes. Arch. F. wissench. prakt. Tierhilk., Berlin, 31, 1905.

[8]Caslick, E. A., Paris, Ky.: Personal communication, May 1944.

[9]Caslick, William, Paris, Ky.: Personal communication, June, 1955.

[10]Dimock, W. W., and Errington, B. J.: Incoordination of Equidae—"Wobblers." J.A.V.M.A., 95, (1939): 201-237.

[11]Ellenburger and Baum, H.: Handbuck der vergliechenden anatomie der Haustre, Julius Springer, Berlin, 1932.

[12]Harem, Tom: Investigations of Etiology and Pathogenicity of Equine Chronic Arthritis. Vet. Rec., 7, (1937): 411-431.

[13]Howell, C. E., Hart, C. H., and Ittner, N. R.: Vitamin A Deficiency in Horses. Am. J. Vet. Res, 2, (Jan., 1941): 60.

[14]Jones, T. C., Doll, E. R., and Brown, Ross: The Pathology of Equine Incoordination. Proc. Book AVMA (1954): 139-149.

[15]Olafson, Peter: Wobblers Compared to Ataxic Lambs. Cornell Vet., 32, (1942): 301-314.

[16]Marsh, H., and Swingle, Karl F.: The Calcium, Phosphorus, Magnesium, Carotene, and Vitamin A Content of Blood in Range Cattle in Eastern Montana. Am. J. Vet. Res., 21, (March, 1960) 212-222.

[17]Mitchell, W. M.: A General Consideration of Unsoundness in Horses. Vet. Rec., 10, (1930): 89, 525; 11, (1931): 412, 1126; 13, (1933): 918; 15, (1935): 1501; 16, (1936): 1365.

[17a]Mitchell, W. M.: A General Consideration of Unsoundness in Horses. J. Comp. Path. & Therap., 50, (1937): 284.

[18]Reigh, Peter, Shwaghman, Harry, and Craig, John M.: Lycopenemia. New England J. Med., 262, (Feb. 11, 1960): 262-269.

[19]Rickard, Charles G.: Personal communication, Oct. 18, 1955.

[20]Schulz, W.: Synovialgruben beim Pferde. Arch. f. wissensch. prakt. Tierheilk., 41, (1915): 245.

[21]Sipple, W. L.: Equine Degenerative Arthritis. Master of Science thesis, 1942, Cornell University Library, Ithaca, N.Y.

Editorial

Research in Veterinary Science Threatened

New knowledge which adds to the understanding of veterinary medicine is almost invariably a product of research. Consequently, it is a matter of great concern to all veterinarians, whether they be in practice, research, or other phases of veterinary medicine, when national legislation threatens to hamper veterinary research. Such legislation was initiated when a humane treatment of experimental animals bill was placed before the Senate Labor and Public Welfare Committee on May 18, 1960. The bill, S. 3570, known as the Cooper Bill, was introduced by Senator John Sherman Cooper (Ky.) and co-sponsored by Senators Gruening (Alaska), Bartlett (Alaska), Byrd (W.Va.), Randolph (W.Va.), Kefauver (Tenn.), Mansfield (Mont.), McNamara (Mich.), Morse (Ore.), Proxmire (Wis.), and Clark (Pa.).

A companion bill (H.R. 12587) was introduced into the House of Representatives by Martha Griffiths (Mich.) on June 9, 1960. Representative Griffiths was instrumental in achieving passage of the Federal Humane Slaughter Act in 1958.

Supporting the bills are such groups as the Animal Welfare Institute, the Humane Society of the United States (not to be confused with the American Humane Association), and the Society for Animal Protective Legislation.

Medical Groups and Antivivisectionists Oppose the Bills

Opposing the bills are the National Society for Medical Research, Illinois Society for Medical Research, Animal Care Panel, Association of American Medical Colleges, American Association of Land-Grant Colleges and State Universities, American Heart Association, and, paradoxically, the National Antivivisectionist Society.

According to the director of the vivarium at the University of California Medical Center at Los Angeles and president of the Animal Care Panel, Dr. Bennett J. Cohen, a veterinarian (see *J.A.V.M.A.* (Jan. 1, 1961): 43-44), the bill is viewed as a "legislative proposal whose enforcement would require expensive, massive, and totally unproductive machinery. . . [the bill] has no constructive provisions to deal with our real current needs in laboratory animal care. . . . [passage of such a bill would result in] a significant reduction in the investigator's productive research time while he completes the useless applications, forms, and reports required of him."

Probably the most vehement in expressing disapproval of the bills was Dr. Lester R. Dragstedt, president of the National Society for Medical Research. Quoting from Dr. Dragstedt, "The Cooper Bill has no constructive provisions. It only proposes to create a cops-and-robbers game to drain away the time and resources of scientists trying to find better ways to save lives and alleviate suffering." Dr. Dragstedt said, "Good care of laboratory animals is more than a matter of humanity. It is a matter of scientific accuracy and efficiency. A stray germ or an unanticipated physical condition in a test animal can waste all of the work."

Research Efforts Would Be Curtailed

There are several ways passage of the bills would hamper or complicate animal research in human and veterinary medicine and in agriculture.

It would impose federal control on research by requiring that every step of the research program supported in any way by federal money be approved by the Secretary of Health, Education, and Welfare (HEW). If a change in method were required, work on the project would have to cease until further approval could be obtained.

It would require a large amount of clerical work and record keeping that would consume the time of scientists and add to the cost of research. More and more of the funds allocated to research would be directed into supporting paper work and less and less into supporting active research.

It authorizes appointment of a force of inspectors by the Secretary of HEW who would prescribe their duties. Unless these inspectors were competent enough to make judgments about scientific research regarding food-producing livestock and smaller

laboratory animals as well as humane treatment of all these animals, they could impose many unnecessary and illogical requirements on research workers. No consideration is given in the bills to selection of inspectors to fill the position that would be created, and no basis or standards for choosing these inspectors are mentioned.

Concerning the care of animals, section 4A states: "All premises where animals are kept shall provide for a comfortable resting space, adequate space and facilities for normal exercise, and adequate sanitation, lighting, temperature control, and ventilation." Wording is so broad that an inspector could interpret this regulation in almost any way he saw fit. For example, what one inspector might consider adequate space for normal exercise might not be adequate in the judgment of another. Adequate space for normal exercise for normal dogs, pigs, or other animals might include an acre of countryside, or it could simply be adequately spacious cages or pens. Unless these details are specified, inspection could impose unrealistic and unnecessary burdens on all types of research projects. When all research projects involving all types of livestock and small laboratory animals are considered, we find that a tremendous financial outlay would be required to provide an active program of recruitment and training of inspectors in order to provide adequate policing of all the animal research facilities across the country. Furthermore, the physical facilities necessary for the normal health and well-being of experimental animals must be determined by research methods before any agency can specify intelligently the details of animal care.

The bills provide that no grant shall be made to any person, institution, corporation, or partnership, unless that individual or agency applying for or receiving the grant has a certificate of compliance with this act. A medical school, in accepting a grant for a new building, would be required, during the life of the building, to obtain permission from the Secretary of HEW for every piece of research undertaken in which experimental animals were to be used. Such a provision seemingly would lead to unnecessary government control of research performed in such new buildings.

Bills Won't Achieve Goals of Sponsors

Because application of the provisions in the bills are restricted to research financed by federal grants, it appears doubtful that enactment of these bills into law will affect those research establishments where unsatisfactory conditions are most likely to occur. Many, if not most, of the federally financed research projects already have excellent facilities for caring for experimental animals (see *J.A.V.M.A.*, July 15, 1960: 129-135). Consequently, the bills are unlikely to accomplish the goals of those who sponsor them. The National Antivivisectionist Society objects to the bills because they are not severe enough; they feel that only 1% of experimental animals would be protected, that no effective penalties are included, and that the bills would not be enforced.

Humane Considerations Needed, But Not Restricted Research

Institution of practical measures to improve conditions for experimental animals would be a noteworthy achievement. To institute these measures at the expense of research, or for the purpose of subverting research, is a threat to our future health, welfare, and security. It behooves all of us, as veterinarians, to maintain constant vigilance to assure that the research efforts that have made our profession useful to our society in general and to our animal industry in particular are not tied up by legislative maneuverings of misguided, unrealistic, or malicious individuals and groups. The ultimate goal of these bills or any bills should be to benefit the public welfare. We should not be content with any legislation that promises less. The Cooper-Griffiths bills, as written, do not seem to fully serve the public interest.

Present Considerations

Although the bills were not acted upon last year, they are expected to be introduced again in 1961. In the meantime, the AVMA, through its Research Council and allied medical and scientific organizations, has been analyzing this legislation and will declare its position at an appropriate time.

Veterinary associations are urged to consult with the AVMA headquarters in Chicago and to move with extreme care in regard to supporting groups interested in these bills. Inopportune support could result in serious consequences for the profession. —A.F.

from the *Research Journal*

Transfer of FMD Immunity

Pregnant mice were inoculated with the virus of foot-and-mouth disease (FMD) approximately 12 days before parturition. At birth, the offspring of immune dams were placed with control dams, and the offspring of the control dams were placed with immune dams. Challenge of the immunity of offspring, 5 to 7 days old, with dilutions of FMD virus gave results indicating that humoral immunity was transferred *in utero* and through milk from immune dams to their offspring or to suckling mice.—[*C. H. Campbell: Transfer of Immunity to Foot-and-Mouth Disease Virus from Maternal Mice to Offspring. Am. J. Res., 21, (July, 1960): 679-700.*]

Moraxella bovis in Keratoconjunctivitis

Moraxella bovis was isolated from lacrimal secretions of 90 per cent of the cattle with clinical cases of infectious bovine keratoconjunctivitis. It was not isolated from the aqueous humor of any infected animal. Other agents were not isolated from the lacrimal secretions and aqueous humor under the conditions of these experiments.

Infectious bovine keratoconjunctivitis was experimentally produced in 43 of 59 calves inoculated by 3 methods. Koch's postulates in respect to *Mor. bovis* were fulfilled.

This work further strengthens the belief that *Mor. bovis* is the etiologic agent in infectious bovine keratoconjunctivitis.—[*J. B. Henson and L. C. Grumbles: Infectious Bovine Keratoconjunctivitis. I. Etiology. Am. J. Vet. Res., 21, (Sept., 1960): 761-766.*]

Strongyloides papillosus Migration

The migration of larvae of *Strongyloides papillosus*, the intestinal threadworm of domestic ruminants, was studied in order to ascertain the route of migration during and after skin penetration and the pathologic changes elicited by the migrating larvae. In percutaneously infected lambs, the route was similar to that described for certain other species of Strongyloides. The minimum elapsed time for larvae to migrate from the surface of the skin, through the lungs, and to the small intestine was 3½ days. The minimum prepatent period was 9 days. Third-stage larvae were recovered from the circulating blood 12 to 72 hours postinoculation. Larvae were also recovered from the gracilis muscle (the site of inoculation), the loin, the diaphragm, and the abdominal cavity. Larvae were present in the skin 15 minutes to 48 hours after inoculation. In 3 susceptible lambs, mechanical destruction of skin tissue was minimal after larval penetration; however, 3 resistant lambs after larval exposure had diffuse dermatitis and inflammation of the skin, characterized by edema and a marked leukocytic infiltration of the superficial dermis and desquamation of the superficial epithelium. In biopsy samples from these resistant lambs, the larvae were undergoing phagocytosis. Petechial and ecchymotic hemorrhages in the lungs of susceptible lambs were found to be severe only during the prepatent period of infection. Damage to the small intestine, in the form of a severe catarrhal enteritis, was usually confined to the duodenum and jejunum.—[*J. H. Turner, W. T. Shalkop, and G. I. Wilson: Experimental Strongyloidiasis in Sheep and Goats. IV. Migration of Strongyloides papillosus in Lambs and Accompanying Pathologic Changes Following Percutaneous Infection. Am. J. Vet. Res., 21, (July, 1960): 536-546.*]

Swine Enteroviruses

A prototype strain (MF) of swine enterovirus was used to study experimental infection in 28 young pigs kept in the laboratory and in 9 newborn pigs kept in a naturally infective environment. Eight young pigs were used as controls.

The 12 pigs infected by either nasal-oral or parenteral routes and the 8 pigs contracting infection in their native environment became sick; of these 20 pigs, 14 died. At necropsy, these pigs had fibrinous effusions involving serous cavities, ulcerative enteritis, lymphadenitis, and pneumonitis. The histologic changes supported the gross findings, and included meningitis. Enteroviruses were seldom found in effusions; however, gram-negative bacteria were commonly present.

None of the 16 pigs kept in isolation units developed any signs of illness after nasal-oral inoculation with virus, and they did not have any gross tissue abnormalities at necropsy. Mild inflammatory lesions, largely those of catarrhal enteritis, were present and were most intense during the first 3 days of the infection.

In all pigs, enteroviruses were recovered from the intestine; very high concentrations of virus were present in the colon. Virus was recovered less consistently from visceral organs; a viremia was not demonstrated. A specific antibody was developed in the infected pigs.—[*G. W. Beran, H. A. Wenner, A. A. Werder, and N. R. Underdahl: Enteroviruses of Swine. III. Studies on Experimental Infection in Pigs. Am. J. Vet. Res., 21, (Sept., 1960): 723-733.*]

New Books

Orthopedic Surgery of the Dog and Cat

This book will serve as a valuable and welcome monograph for the student, an aid for teachers, and an orthopedic reference for the veterinarian practicing this branch of small animal surgery. It fulfills the stated aims of the author.

The material is presented in a straightforward style, is easy to understand, and is well organized. It deals first with the fundamentals of healing, aseptic surgery, and materials and methods, and then with specific anatomic areas and their various types of fractures and dislocations. The last 4 chapters deal with related orthopedic conditions — soft tissue repair, intervertebral disk disease, and hypertrophic pulmonary osteoarthopathy.

In sections relating to the various types of fractures and dislocations, each type is presented in an orderly fashion under the headings of etiology, pathology, signs, diagnosis, and treatment. In most instances, the various methods of treatment which have been reported or are currently in use are presented. Some methods are not included: surgical rotation of the tibial tubercle as a means of correcting certain types of patellar luxations and corrective surgery for alignment or realignment of deformed bones.

The text is well illustrated, and the reproduction of drawings, photographs, and radiographs are clear and offer good visual assistance to the verbal descriptions.—[*Orthopedic Surgery of the Dog and Cat. By Ellis P. Leonard. 296 pages; illustrated. W. B. Saunders Co., West Washington Sq., Philadelphia 5, Pa. 1960. Price $12.50.*]—WADE O. BRINKER.

News

Recent AVMA Research Fellows Report Accomplishments

Feb. 1, 1961, is the kick-off date for a nation-wide campaign to raise funds for the AVMA Research Trust Fund. The fund, supported by the veterinary profession, has for many years given financial aid to qualified veterinarians seeking postgraduate training for careers in research and teaching.

In this issue of the JOURNAL and in several others during the campaign, the stories and accomplishments of recent AVMA Research Fellows will be reported. These fellows have all completed their AVMA-supported projects within the past 3 or 4 years.

The work they have done and are continuing to do testifies to the value of the AVMA Research Trust Fund.

AVMA Fellow Dr. W. D. Carlson Uses Grant to Earn Ph.D. Degree

Dr. William D. Carlson (COL '52), AVMA Fellow from 1955 to 1957, earned his Ph.D. degree from the University of Colorado Medical Center with the funds provided to him from the AVMA Research Fund. His degree-winning thesis was entitled "A Comparison of the Effects of Fractionated Therapeutic Doses of X-Irradiation upon Neoplasms and Normal Tissues."

Dr. William D. Carlson

Dr. Carlson is now an associate professor of radiology at the College of Veterinary Medicine, Colorado State University. He was appointed an assistant professor of radiology in 1957, immediately after receiving his Ph.D. degree, and was promoted to his present position in 1958.

Dr. Carlson has been co-author of 5 scientific articles that have appeared in the JOURNAL of the AVMA. He has been the sole author of 2 more as well as 7 "What Is Your Diagnosis?" features for the JOURNAL. Other professional journals have printed 6 more articles prepared by him. His research has been mainly in the field of small animal medicine and much of it deals with research on and treatment of canine patients.

As his title, associate professor of radiology, would indicate, Dr. Carlson has worked a great deal in the field of radiology. He has presented 37 scientific papers at professional meetings from the State of Washington to the State of Florida—28 of them having been directly concerned with the subject of radiology. Dr. Carlson appeared on a radiology panel "Radiation Therapy," at the 96th annual AVMA Convention in Kansas City, Mo., in 1959 and, at the same meeting, presented a paper entitled "Neoplasia: A Radiographic Study—A Scientific Display."

Dr. Carlson is currently a project leader for 3 research projects. One is a study of the "Effects of Ionizing Irradiation upon the Functional and Structural Status of the Bull Testicle," sponsored by the U.S. Atomic Energy Commission. The other 2 projects, sponsored by the Mark L. Morris Foundation, are "Effects of Ionizing Irradiation upon the Canine Ovary" and "Elbow Dys-

plasia—A Pathological and Genetic Study."

He is a member of the AVMA, the American Veterinary Radiology Society, the Radiation Research Society, the Technical Advisory Committee on Radiation Protection to the Colorado State Public Health Department, the Scientific Advisory Board of the Mark L. Morris Foundation, the Colorado State University Radiation Safety and Hazards Committee, the Research Committee, Colorado State University Nuclear Science Institute, and many other scientific organizations and foundations.

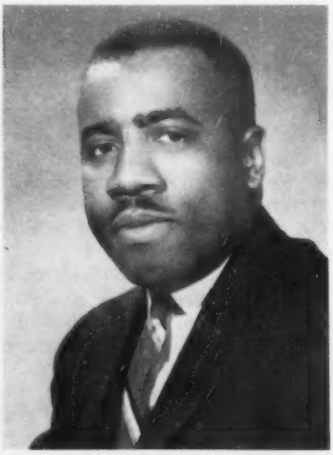
Along with his other responsibilities at Colorado State University, Dr. Carlson is in charge of the development of a new course "Radiobiology," which will be a coordinated course taught by several of the colleges.

Dr. W. C. Bowie Earns Ph.D. Through AVMA Research Fellowship

Dr. Walter C. Bowie (KSU '47), awarded an AVMA Research Fellowship in 1957, earned his Ph.D. degree from Cornell University in 1959. He is now the head of the Department of Physiology and Pharmacology at Tuskegee Institute, Tuskegee, Ala.

Dr. Bowie was selected as head of the department in 1959 after completing his work for the Ph.D. degree with the thesis "*In Vitro* Studies of Rumen Microorganisms Using a Continuous Flow System."

The manuscript of Dr. Bowie's thesis is being prepared for publication in the *American Journal of Veterinary Research*. He is the author of 2 other articles; "The Role of Animals in Medical, Nutritional and Dental Research," which appeared in the *National Dental Journal* in November, 1951, and "Carbohydrate Metabolism in the Rumen," which appeared in the *Cornell Veterinarian*.



Dr. Walter C. Bowie

Dr. Bowie's major research interests at the present time are concerned with mechanisms of pathogenicity and immunity in listeriosis, and serum transaminase levels in leptospirosis and infectious hepatitis.

He is a member of the AVMA, the New York Academy of Sciences, and the New York Society of Experimental Biology and Medicine.

Dr. G. T. Woods Earns M.S. Degree with Help of AVMA Research Grant

An AVMA Research Fellow for the summer of 1959, Dr. George T. Woods (KSU '46) was able to earn a M.S. degree with the help of a grant from the AVMA Research Fund. Dr. Woods was awarded his degree at Purdue University; his thesis was "A Study of *Leptospira ballum* Infection in Swine." He is now an associate professor of veterinary microbiology, public health, and veterinary research at the College of Veterinary Medicine, University of Illinois.

Dr. George T. Woods

Dr. Woods is the author of 7 scientific

articles which have appeared in professional publications, 3 of them in the JOURNAL of the AVMA: "Gut Edema in Three Illinois Swine Herds," in December, 1951; "Field Results with Huddleson's Brucella M Vaccine in Fourteen Illinois Herds," in April, 1954; and "Observations on Transmissible Canine Venereal Granuloma." in February, 1957. He has been co-author of 6 other scientific articles. At the present time, 1 article prepared by Dr. Woods, "Swine Brucellosis Testing in Illinois," has been accepted for publication in the *Illinois Veterinarian*: 1 article of which he is co-author has been submitted for publication; and 3 other works of which he is a co-author are in preparation.

Dr. Woods is a member of the AVMA, the American Public Health Association, the American Association of Teachers of Preventive Medicine and Veterinary Public Health, the Wildlife Disease Association, and the Eastern Illinois and Illinois V.M.A.'S.

Dr. P. H. Coleman Former AVMA Fellow

Dr. Philip H. Coleman (Ga '56), a fellow of the AVMA Research Council for 4 years, earned his M.S. and Ph.D. degrees with the help of AVMA research fellowship funds. He is now the assistant chief of the Veterinary Research Unit, U.S. Public Health Service Communicable Diseases Center, at Atlanta, Ga.

Dr. Philip H. Coleman

Dr. Coleman was an AVMA Fellow from 1956 to 1959 at the University of Wisconsin. His M.S. thesis was entitled "Acquired Immunological Unresponsiveness to Newcastle Disease Virus," and his Ph.D. thesis, "Studies of the Antigenic Nature of the Myxoviruses."

Dr. Coleman has worked with the Public Health Service and was formerly the assistant chief at the Southeastern Rabies Station. He is a member of the AVMA and several veterinary fraternities.

Microbiology Congress Planned at Montreal

Plans are now under way in Montreal, Que., for the Eighth International Congress of Microbiology to be held there Aug. 19-25, 1962, under the auspices of the Canadian Society of Microbiolgists.

The program will be made up of 5 sections: structure and function, agricultural microbiology, industrial microbiology, medical and veterinary microbiology, and virology. Two or more symposiums are being planned for each section. All symposium speakers will be invited. Reports will also be given at all sections.

Space is available for scientific and commercial exhibits.

Inquiries should be addressed to Dr. N. E. Gibbons, VIII International Congress for Microbiology, National Research Council, Ottawa 2, Ont., Canada.

Dr. Mark L. Morris Honored by New York Academy of Sciences

AVMA President-Elect Dr. Mark L. Morris (COR '26) was elected a fellow of the New York Academy of Sciences, Dec. 1, 1960.

Dr. Morris has been an active member of the Academy.

He was presented with an engraved certificate which stated: "This is to certify that on Dec. 1, 1960, Mark L. Morris was elected a Fellow of the New York Academy of Sciences in outsanding recognition for scientific achievement and promotion of science."

Election to fellowship in the academy is an honor conferred on a limited number of members who, in the estimation of the Council, have done outstanding work in the advancement of science.

Fund-Seeking Women to Call on Veterinarians

Veterinarians across the nation will receive during the month of February women callers who will be seeking not veterinary services, but funds. These women are members of the Women's Auxiliary to the AVMA. They will discuss with veterinarians the needs of veterinary research, the role of the AVMA Research Fund in meeting these needs, and the way individual veterinarians can help.

At their annual meeting in Denver last August, the Women's Auxiliary voted to accept as one of their major projects for 1961 the challenge of raising $75,000 for the AVMA Research Fund. Their campaign has been scheduled for the month of February. During the month, the 7,000 members of the Women's Auxiliary will try to contact each AVMA member personally and, utilizing prepared materials, tell them of the Fund's program to aid graduate veterinary research students and of the need for more money if the program is to continue.

The AVMA Research Fund's Fellowship Program has only enough funds presently available to operate for one more year. More than 60 AVMA fellows have received aid from the Research Fund since its beginning in 1942. Many of these men are now leaders in veterinary medicine. This year there are only 10 AVMA fellows, and 6 of these are studying on renewal grants. Individual grants range from $1,320 to $4,725 annually. Total cost will be $35,820 for the 1960-1961 program. To continue and expand the fellowship program, it will be necessary to replenish the fund now.

Each state's women's auxiliary has accepted a quota to meet in their fund-raising efforts. One state, Vermont, has already raised more than 2/3 of its quota. Mrs. David Baldwin, Putney, reports that Auxiliary members in her state succeeded in raising $220 for the Research Fund at the annual meeting of the Vermont V.M.A. The Vermont quota is $307.82. Mrs. Baldwin plans to follow-up fund-raising efforts in February with further personal contact and direct mail to veterinarians in the state. Campaign results of other states will be reported in the JOURNAL as soon as they are known.

The Auxiliary was authorized to serve as the AVMA official fund raisers by the AVMA House of Delegates at their meeting last August. Since then they have devoted their time to organizing the campaign and learning the story of the Research Fund which they will tell veterinarians when they call on them this month. The challenge of replenishing funds for the AVMA Fellowship Program is not theirs alone—it's one they share with the entire veterinary profession.

These are the materials to be used by the Women's Auxiliary fund raisers in telling the story of the AVMA Research Fund to veterinarians across the country.

Veterinarian's Son Wins Grand Championship with Southdown Dressed Lamb

David Culbertson, 13, son of Dr. (OSU '45) and Mrs. W. H. Culbertson, Joy, Ill., won the grand championship of both the junior and open competitions with his Southdown dressed lamb at the International Livestock Exposition in Chicago last November.

David's lamb weighed 95 lb. and produced a carcass weighing 53 lb. It had a loin eye of 3.08 square inches and only 0.3 inch of backfat over the ribs. When the lamb was judged alive it ranked only thirteenth among 53 lambs in its class. Evidently the judges failed to detect its high meat-producing qualities.

David has a flock of 10 Southdown ewes which he is raising on a vacant lot in Joy, Ill., as a 4-H project. It was the first time he had exhibited at the International exposition.

Veterinarian's Wool Takes Grand Champion Prize at International Livestock Exposition

Dr. Harry E. Furgeson (COL '41), Anaconda, Mont., the owner of the world's largest flock of purebred sheep, won the grand champion prize for the wool from his flock at the International Livestock Exposition in Chicago, Ill., last November.

Dr. Furgeson has more than 10,000 sheep, 6,0000 of which are registered Hampshire and Targhee ewes. He also maintains 2,000 head of Herefold cattle on his 250,000-acre ranch, which includes a 13,000-ft. mountain.

Veterinarians Qualify as Veterinary Pathologists

Upon completion of a qualifying examination, 13 veterinarians were certified as veterinary pathologists and elected to membership in the American College of Veterinary Pathologists on Nov. 25, 1960.

They are: Drs. J. N. Beasley (TEX '49), College Station, Texas; H. W. Dunne (ISU '41), State College, Pa.; M. J. Eggert (OSU '35), Ames, Iowa; G. A. Elliott (GA '53), West Chester, Pa.; A. H. Groth, Jr. (AUB '54), Auburn, Ala.; K. Hubben (UP '53), Media, Pa.; I. J. Lebish (COR '54), Norwalk, Conn.; F. T. Lynd (OKL '35), Honolulu, Hawaii; T. E. Murchison (TEX '55), Kissimmee, Fla.; P. M. Newberne (AUB '50), Auburn, Ala.; M. A. Ross (OSU '39), Rockville, Md.; R. J. Van Ryzin (ISU '55), Norwich, N.Y.; and G. L. Waxler (ILL '53), East Lansing, Mich.

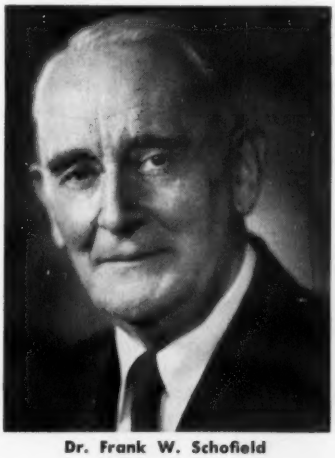
The examination was conduced by the American College of Veterinary Pathologists at the University of Chicago, Chicago, Ill. It tested knowledge of clinical pathology, general basic pathology, avian diseases, diseases of large animals, laboratory animals, and small animals, and included practical examinations in gross and microscopic pathology.

The following day, Nov. 26, 1960, the entire membership of the American College of Veterinary Pathologists participated in its annual seminar entitled "Disease of the Respiratory System."

Officers elected for 1961 are: Drs. H. R. Seibold (UP '31), Greenport, Long Island, N.Y., president; W. H. Eyestone (KSU '41), Bethesda, Md., vice-president; and C. R. Cole (OSU '43), Columbus, Ohio, secretary-treasurer.

Dr. F. W. Schofield Receives Korean Order of Merit Award

Dr. F. W. Schofield, (ONT '10) recently was awarded the Order of Merit, National Foundation, Class III. award in Korea for his 30 years of contributions to that country. This is the highest Korean honor which can be presented to a foreign born civilian.



Dr. Frank W. Schofield

A Korean newspaper clipping said of Dr. Schofield, "Dr. Schofield taught Korean youths following his first arrival here in 1917 and enthusiastically supported a national independence movement on March 1, 1919.

"The Canadian, who was expelled from this country by the Japanese for his support of the national uprising, revisited the country in 1958 to continue helping the democratic development in Korea."

Recently Dr. Schofield has been working with students of pathology teaching graduate students in Korea's college of veterinary medicine, teaching English and Bible classes, and devoting time to a Korean orphange.

In 1954, Dr. Schofield was awarded the Twelfth International Veterinary Congress Prize at the AVMA annual meeting in Seattle, Wash., for outstanding service to veterinary science and the veterinary profession.

Ralston Purina to Give Ten Fellowships This Year

Under the Ralston Purina Research Fellowship Awards Program for the 1961-1962 school year, 10 fellowships of $2,000 each will be granted for graduate study in agricultural research.

The awards will be made in the fields of nutrition and physiology as applied to dairy, poultry and animal husbandry; and in research on transmissible diseases of livestock and poultry. Three awards each will be given in dairy husbandry, animal husbandry, and poultry husbandry; and one in the field of veterinary science.

Individuals qualified for graduate study in any land-grant agricultural college or approved veterinary college, including Canadian colleges, who possess appropriate qualifications and submit completed applications may be eligible for one of the $2,000 fellowships. The application must be in the hands of the awards committee by March 1 of the year the award is to be made.

Selection of recipients of the grants will be made by a committee. Dr. W. A. Hagan (KSU '15), National Animal Disease Laboratory, Ames, Iowa, will represent the AVMA.

Applications for the awards may be obtained by writing the Ralston Purina Research Awards Committee, c/o Mr. J. D. Sykes, Ralston Purina Company, St. Louis 2, Mo.

Livestock Conservation, Inc., Plans Annual Meeting

Plans are under way for the annual meeting of Livestock Conservation, Inc., in Des Moines, Iowa, Feb. 22-23, 1961, at the Fort Des Moines Hotel.

A general session on specific benefits to the various segments of the livestock industry will start the meeting. Leaders from the livestock-producing, transportation, marketing, meat-processing, and veterinary fields are being selected for the program.

Sessions of Livestock Conservation, Inc.'s, 4 national standing committees, brucellosis, safe handling of livestock, cattle grubs, and hog cholera, will also be held. Chairmen of these major standing committees are: Drs. John C. Macfarlane, chairman, National Safe Livestock Handling Committee; J. W. Cunkelman (MSU 38), chairman, National Cattle Grub Committee; Frank J. Mulhern (AUB '45), chairman, National Hog Cholera Committee; and S. H. McNutt (ISU '17), chairman, National Brucellosis Committee. Several of the standing committees are planning "open-house" panel discussions on problems assigned to that group in addition to their regular sessions.

Dr. H. E. Kingman, Jr., AVMA executive secretary and treasurer, is currently president of Livestock Conservation, Inc.

Among the States and Provinces

Arizona

CANADA'S LEGISLATION IS MORE ADVANCED THAN U.S. SAYS CANADIAN VETERINARIAN.—Canada is a little more advanced in its veterinary legislative program than the United States says Canadian veterinarian, Dr. James Archibald (ONT '49).

Principal speaker at the meeting of the Southern Arizona Veterinary Medical Association, December 3-4 in Tucson, Dr. Archibald said during a press interview, "Whenever there is an outbreak of hog cholera, all hogs in the Canadian area are slaughtered. The same is true of cattle suf-

Dr. James Archibald

fering from foot-and-mouth disease. In the United States, hogs in affected areas are vaccinated, but the disease continues."

Dr. Archibald is professor and head of the Division of Small Animal Medicine and Surgery at Ontario Veterinary College, Guelph. His lecture at the Southern Arizona V.M.A. meeting was on "Modern Developments in Veterinary Surgery and Treatment."

California

LOS ANGELES COUNTY LIVESTOCK DEPARTMENT HAS NEW HOME.—The Los Angeles County Livestock Department has opened new offices in South Gate, Calif.

The new site of the offices was carefully selected so the Department could serve the two new stockyards in the county at Dairy Valley and Industry. The Livestock Department offices had for 36 years been located at the Union Stockyards in Vernon, Calif. When these stockyards were closed, the Department selected its new location.

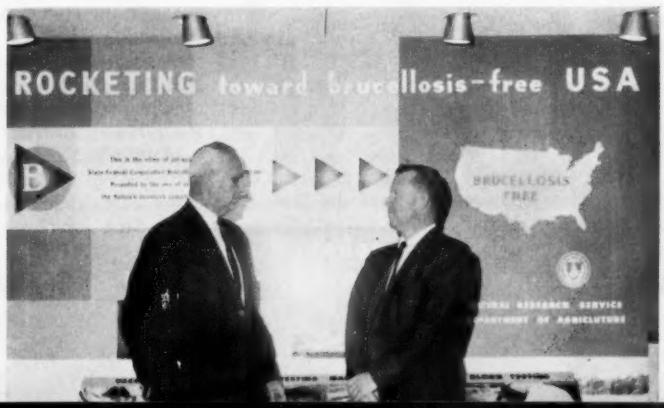
To celebrate the opening of the new offices, an open house was held Nov. 2, 1960. Several exhibits were set up depicting Livestock Department activities in tuberculosis, brucellosis, rabies, mastitis, and vesicular disease control. Other exhibits illustrated the varied activities of the department's laboratory in bacteriology, histopathology, parasitology, serology, mycology, and tissue culture.

Representatives of the livestock industry, federal, state, and local governments, and veterinarians toured the offices.

Colorado

VETERINARIANS AT COLORADO STATE UNIVERSITY RECEIVE GRANTS FOR STUDIES.—Seven veterinarians at Colorado State University have received grants totaling $122,944 for further study on their various projects.

Dr. Dale D. Maag has received a $7,302 grant from the National Institutes of Health to finance a study entitled "Selenium Toxicosis." This study will involve the feeding of selenocysteine or selenomethionine to cattle—the feeding of sodium selenite to cattle with a low protein ration and the feeding of sodium selenite with selenium-bearing range plants to cattle. Selenium-bearing plants will be analyzed for alkaloids and toxic substances other than selenium. If other toxic substances are isolated, they will be fed to cattle and the results observed.



Mr. Leland R. Weaver, acting mayor of South Gate, Calif. (left), and Dr. Robert J. Schroeder, director, County of Los Angeles Livestock Department, view one of the exhibits shown at the Department's recent open house.

Drs. William D. Carlson and F. X. Gasner have been awarded a $43,952 grant by the Atomic Energy Commission for research on the effects of ionizing irradiation on the functional and structural status of the bull testicle.

Drs. Robert H. Udall and Lee E. Yeager have received a $25,690 grant from the Atomic Energy Commission to study effects of the environment on a wild deer population. They will investigate the effects of climatic and physiographic factors on the food supply and population dynamics of migratory herd of mule deer.

Drs. R. M. Johnson and E. E. Flamboe have been awarded a $46,000 grant by Wright-Patterson Air Force Base to conduct studies of environmental stress on adrenal-thyroid relationships. The fundamental aspect of this investigation will be further explored by determining the mode of action of adrenocortical hormones on thyroid activity with the question in mind of whether the action is directly on the thyroid or mediated via the pituitary gland.

Florida

Tick Eradication Training School Held.—Special training in tick eradication was provided at Laredo, Texas, from July 18 to Oct. 21, 1960. The school was established following the recent finding of cattle fever ticks in Florida and the intensification of tick-inspection activities in states subject to infestation.

Instructors were provided by the ADE and AIQ divisions of the USDA. Selected personnel of both divisions and of state regulatory agencies attended the school.

The sessions were divided into two categories: tick identification and routine inspection and eradication activities. Thirty-four inspectors participated in a series of two-week programs on tick identification and routine inspection and eradication activities. Twenty-seven more inspectors attended a second series of one-week training sessions devoted to tick identification.

Illinois

Eastern Illinois V.M.A. Elects New Officers.—New officers elected at the December 1 meeting of the Eastern Illinois Veterinary Medical Association are: Drs. Harold Heffernan (ILL '54), Danville, president; L. E. Boley (KSU '32), Urbana, president-elect; R. E. Beaumont (ISU '59), Urbana, secretary-treasurer.

Dr. B. A. Rasmusen (COR '55), University of Illinois Department of Animal Genetics, discussed blood groups and related blood dyscrasias in animals at the meeting.

Iowa

Dr. Frank B. Young Retires.—Dr. Frank B. Young (KSU '19), secretary of the Iowa V.M.A. and editor of the *Iowa Veterinarian* for 11 years, retired Jan. 1, 1961.

Dr. Frank B. Young

Dr. Young had sold his 40-year-old practice in Waukee, Iowa, in 1959 to devote his entire time to the affairs of the association. He had been elected to the office of secretary and editor in 1949. During his term, the membership of the Iowa V.M.A. has grown from 450 to approximately 860 members.

Dr. Young has actively participated in the Iowa Interprofessional Association to bring cooperation and understanding between the various professions. He helped to organize the first meeting of the Midwest Veterinary-Nutrition Conference, under the sponsorship of the state associations and the Midwest Feed Manufacturers Association.

In 1954 Dr. Young was appointed chairman of the AVMA Special Committee on Veterinary Supply Problems. He served on this committee for three years. In 1955 he was

elected AVMA Executive Board member from District VI which represents Iowa and Minnesota.

• • •

JOINT MIDWEST SMALL ANIMAL ASSOCIATION AND AAHA REGION III MEETING HELD.—For the purpose of bettering treatment and hospital care given to small animal patients, the Midwest Small Animal Association held a joint meeting with the American Animal Hospital Association on Nov. 16 and 17, 1960, at Burlington, Iowa. Attending the meeting were 136 veterinarians representing 15 states.

Some of the principal speakers at the meeting were: Drs. D. K. Detweiler (UP '42), University of Pennsylvania, director of comparative cardiovascular studies, who discussed recording of heart sounds, the electrocardiogram in dogs, and heart diseases of dogs; C. M. Wilhelmj, M.D., College of Medicine, Creighton University, Omaha, Neb., who discussed blood pressure in the dog; John R. Annis (COL '50), Purdue University, who discussed and illustrated with slides surgery of the head and neck of the dog; and James Baker (COR '40), Cornell University, who discussed and illustrated with slides new advances in distemper immunization.

New officers of the Midwest Small Animal Association elected at the meeting are Drs. Bennett J. Porter (ISU '31), Minneapolis, Minn., president; R. J. Cowles (ISU '50), Burlington, Iowa, vice-president; and J. Porter Coble (TEX '40), Springfield, Ill., secretary-treasurer.

In recognition of past services to the Midwest Small Animal Association special scrolls were presented to all its past-presidents.

Nevada

DR. J. L. O'HARRA TO DIRECT DIVISION OF ANIMAL INDUSTRY.—Dr. John L. O'Harra (ISU '43) took over the position of director, Division of Animal Industry, Nevada State Department of Agriculture, on Jan. 1, 1961.

Dr. O'Harra is changing positions with Dr. W. F. Fisher, who has been serving as director of the Division. Dr. Fisher, after serving the veterinary profession for 37 years in a regulatory capacity, requested a less active role.

Dr. John L. O'Harra

Dr. O'Harra had served as assistant director of the Division for the past 4 years. He had been active in many phases of diagnostic, research, and regulatory veterinary medicine in Nevada in recent years.

Vice president of the Nevada State V.M.A., Dr. O'Harra, is also a member of the AVMA, Western Nevada V.M.A., and Intermountain V.M.A. He is an ex-officio secretary-treasurer of the Nevada State Board of Veterinary Medical Examiners, a member of the U.S. Livestock Sanitary Association, and a fellow of the American College of Veterinary Toxicologists.

New York

DR. M. E. MILLER POSTHUMOUSLY HONORED BY NEW YORK V.M.A. VETERINARIAN OF THE YEAR AWARD.—A former Cornell University professor has been selected posthumously as the Veterinarian of the Year by the New York State V.M.A.

Dr. Malcolm E. Miller, who died last April, was selected for the 1960 award by the more than 900 members of the society.

Dr. Miller had headed the Department of Anatomy from 1947 until last April at Cornell. He was internationally known for his contributions to the advancement of the teaching of gross anatomy, particularly of the dog. His book, "Guide to the Dissection of the Dog," published in 1947 and now in its third edition, has been widely used in veterinary colleges throughout English-speaking countries.

In 1946 Dr. Miller began preparation of a textbook, "The Anatomy of the Dog," which was readied for publication shortly before his death and will be published posthumously. It is 750 pages long and contains over 350 illustrations.

Dr. Miller received his D.V.M., M.S., and Ph.D. degrees from Cornell University. He was appointed an instructor in veterinary anatomy at Cornell in 1934, became an assistant professor in 1940, an associate professor in 1945, and professor and head of the Department of Anatomy in 1947. He was secretary of the veterinary college from 1948 to 1960 and also served on many faculty committees.

Dr. Miller was twice elected president of the American Association of Veterinary Anatomists. He was a member of the nomenclature committees of the World Association of Veterinary Anatomists and the American Association of Veterinary Anatomists.

He also was a member of the American, the Southern Tier, and the New York State Veterinary Medical Associations, the American Association of Anatomists, and the American Society of Zoologists.

North Carolina

BLOOD RESEARCH LABORATORY DEDICATED.—The Francis Owen Blood Research Laboratory at the University of North Carolina Medical School was dedicated Sept. 25, 1960. Laboratory workers will study blood abnormalities, using a colony of hemophilic dogs as research material.

Ohio

FIRST CONTINUING EDUCATION PROGRAM HELD AT OSU. — The first of a series of conferences to be offered by Ohio State University in a new Continuing Education Program was held Dec. 20, 1960.

The topic of this particular program was "The Role of Cesarean-Derived Pigs in Disease Control." Some of the subjects discussed on the program were "The Prevalence and Diagnosis of Major Swine Diseases," by Dr. H. E. Goldstein; "Limitations of Present Day Management Practices in the Control of Swine Diseases," by Dr. Robert D. Little (OSU '43), Jeffersonville, Ohio; and "Comparative Performance and Maintenance Cost of Specific Pathogen-Free Pigs," by Dr. George A. Young (COR '43), by telephone hook-up from Lincoln, Neb.

The University plans to hold similar courses on varying topics from time to time to fill the needs and interests of the practicing veterinarian.

Ontario

TORONTO A.V.M. SPONSORS JOINT MEETING WITH AAHA.—A joint meeting of the Toronto Academy of Veterinary Medicine and the American Animal Hospital Association, Region I, was held Nov. 2, 1960, in Toronto, Ont.

This was the first meeting of the AAHA to be held in Canada. The meeting, dedicated to a hospital management theme, was attended by 153 veterinarians.

Some of the topics discussed at the meeting were "The Patient and Its Owner," by Dr. J. R. Currey (ONT '29), Washington, D.C.; "Client Impressions," by Dr. R. S. Edmond (UP '37), Princeton, N.J.; "Keep the Hospital Modern," by Dr. J. Malcolm Baker (ONT '50), Montreal, Que.; and "Upgrading Veterinary Medicine," by Dr. J. Stuart Crawford (COR '27), New Hyde Park, N.Y.

Officers of the AAHA Region I are Drs. William J. Foster (UP '44), Clifton, N.J., director; Leroy McGilvray, program chairman; and Thomas DeGeer (ONT '54), Toronto, Ont., president.

Pennsylvania

PENNSYLVANIA V.M.A. ACTS AGAINST "ANIMAL HOSPITAL" LISTING IN TELEPHONE DIRECTORIES.—The Pennsylvania V.M.A. has written to the Bell Telephone Company requesting that veterinary hospitals not be listed as "animal hospitals" in telephone directories.

The Bell Telephone Company had eliminated the listing of veterinary hospitals and substituted the listing "animal hospitals" in several telephone directories in the East.

Upon investigation, the Pennsylvania V.M.A. committee on ethics found that the decision to list veterinary hospitals as "animal hospitals" had been made by the telephone company and their publications

firm. They had intended to eventually list veterinary hospitals as "animal hospitals" in telephone directories throughout the country.

Since the AVMA Principles of Veterinary Medical Ethics states that there should be only two ethical listings for members of the veterinary profession in telephone directories—veterinarian and veterinary hospitals—the Pennsylvania V.M.A. informed the telephone company of their disapproval and set out to warn other veterinary medical associations that the problem may occur in their area.

Veterinary Military News

New Medical Service School Emblem Approved

Headquarters U.S.A.F. approved the Medical Service School's new organizational emblem recently. The emblem motto is "Servitus per Scientiam"—Service through Knowledge.

The Medical Service School, established in 1950, conducts 35 different courses, and 5 others are on a standby basis. Colonel Benjamin Leach, Chief of Veterinary Branch, and his staff are primarily responsible for the Veterinary Officer Basic Course, Veterinary Technician Course, and Veterinary Specialist Course.—*News Release, Headquarters, Medical Service School, U.S.A.F. (ATC), Gunter Air Force Base, Ala., Nov.* 14, 1960.

New emblem of the U.S.A.F. Medical Service School depicts "Service through Knowledge."

Colonel Marion W. Scothorn (OSU '33) is presented the Army Commendation Medal by Brigadier General Russell McNellis (ISU '28), office of the Surgeon General, Washington, D.C. Colonel Scothorn, commandant of the Army Medical Service Meat and Dairy Hygiene School at Chicago, Ill., received the medal Oct. 31, 1960, when he retired after completing 30 years in military service. He plans to join the staff of Ohio State University.

Deaths

Star indicates member of AVMA

Frederick H. Akin (CVC '06), 79, Tustin, Wis., died Oct. 19,, 1960.

Dr. Akin had practiced in Tustin for 20 years. He had previously practiced in Waukesha, Wis.

Lloyd C. Blank (ISU '31), 55, died of a heart attack Aug. 22, 1960.

Dr. Blank had practiced in Emerson, Iowa, since his graduation. His son, Dr. C. J. Blank (ISU '59), also a veterinarian, had joined him in his practice in 1959.

★**Frank Breed** (COR '11), 49, Tucson, Ariz., died Oct. 17, 1960.

Dr. Breed had been made a life member of the AVMA in 1954.

★**Roy R. Dappen** (KCV '17), 69, Brooklyn, Iowa, died following a heart attack Nov. 23, 1960.

Dr. Dappen had established his practice in Brooklyn in 1927. Since that time 10 young veterinarians became associated with him, seeking training in the field of swine diseases. Dr. Dappen was a recognized specialist in the field.

He was a member of the AVMA and the Iowa V.M.A.

Oscar Glueck (BUD '08), 75, Blue Point, N.Y., died Oct. 27, 1960, after a long illness.

Dr. Glueck came to the United States in 1923 and in 1929 moved to Blue Point where he practiced until he retired in 1952. He was a past-president of the Long Island V.M.A.

Emery C. Sheumaker (KVC '05), 82, a retired veterinarian, died in his home at Mt. Ayr, Iowa, Nov. 8, 1960.

Dr. Sheumaker had practiced in Mt. Ayr for 54 years. He had retired about a year ago.

★**Andrew W. Uren** (MSU '24), 69, of Columbia, Mo., died Oct. 30, 1960.

Dr. Uren had been a member of the University of Missouri faculty since 1924. He had been an extension veterinarian, a member of the Department of Veterinary Science, and a professor and head of the Department of Physiology and Pharmacology.

Dr. Uren is survived by his wife, two sons, John E. Uren (MO '57) and William G. Uren (MO '59), also veterinarians, and a daughter who married a veterinarian, J. F. Johns (MO '52).

Women's Auxiliary

Activities Questionnaire Sent as News Gathering Aid

To prepare a comprehensive report of each auxiliary's activities for publication in the 1961 issue of the *Auxiliary News*, a questionnaire was mailed to presidents, secretaries, and public relations chairmen of constituent auxiliaries.

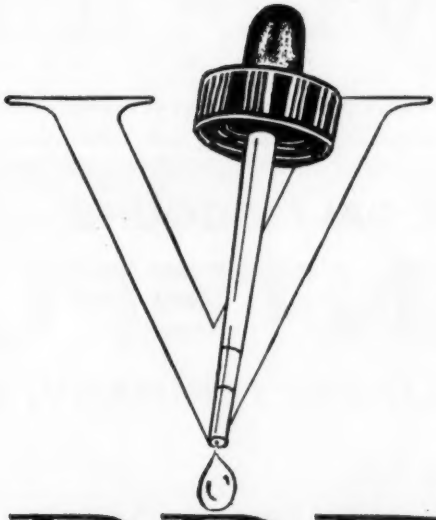
The questionnaire was prepared for a two-fold purpose: to save time for the officer reporting auxiliary meetings, and to determine which auxiliary activities are the most newsworthy across the nation.

Also in the next issue of the *Auxiliary News* will be a round-up story of the Research Fund campaign which will be completed by the Auxiliary in the next few months.

Convention city highlights will appear in the next issue, too. Industrial Detroit's points of interest as well as those of nearby Canada will be featured, along with convention plans for veterinarians' families.

This year's budget provides for an 18-page paper. The 1959 *News* contained 16 pages and only 18 pictures. It is hoped that this year every state, regional, provincial, and student auxiliary will be represented in the *News* not only with a story, but with a picture, too.

If your auxiliary did not receive a questionnaire, write to: Mrs. Akin Simpson, Editor, AVMA Auxiliary News, 1600 Indian Hills Drive, Big Spring, Texas.



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Bull, W. S.: N. Am. Vet. 38:3 (Jan.) 1957.

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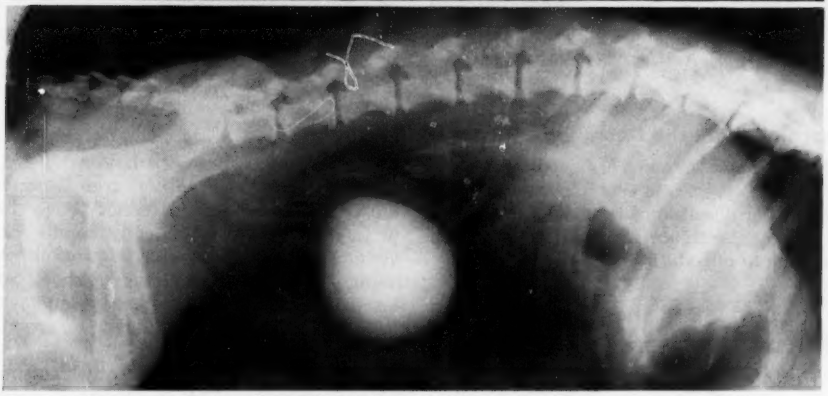

Fig. 1 (above)—Lateral radiograph of dog's abdomen. Radiopaque contrast medium was administered by urethral catheterization.

Fig. 2 (below)—Lateral radiograph of dog's abdomen. Contrast medium was administered intravenously.

History.—A male Dachshund was injured in an automobile accident. The pelvis was fractured, the femur was luxated, and there was abdominal tenderness on palpation. Immediately following the accident, a lateral radiograph (fig. 1) was made after administration of radiopaque contrast medium by urethral catheterization. Twelve hours after the accident and 5 minutes after injection of contrast medium intravenously, another lateral radiograph (fig. 2) was made. A urethral catheter, inserted in order to clearly mark the urinary tract, was discernible on the original radiographs.

Here Is the Diagnosis

(*Continued from preceding page*)

Diagnosis.—Ruptured urethra. On examination of the first radiograph, the contrast medium can be seen dispersed haphazardly in the dog's abdominal cavity. On examination of the second radiograph, the bladder, distinctly outlined by the contrast medium and well forward of its normal location, appears intact. Both pelves of the kidneys and the ureters are visible. The indistinct mass immediately posterior to the bladder is the prostate gland.

Comment.—The dispersion of contrast medium in the dog's abdominal cavity as shown in the first radiograph indicated damage to the urinary tract, possibly bladder rupture, since it occurs occasionally in dogs which are traumatized severely in the pelvic region. However, the intact bladder visible on the second radiograph eliminated bladder rupture as a diagnostic possibility and strongly indicated rupture of the urethra. As a result, the clinician could give the client a reasonably accurate prognosis and prepare himself to deal with the relatively complicated technique of repairing the urethra.

Although rupture of the bladder occurs occasionally in dogs with severe pelvic damage, rupturing or severing of the urethra is relatively rare. Whenever there is a crush injury to the pelvis, radiographic examination of the urinary tract is advisable.

This report was submitted by Ronald F. Jackson, D.V.M., St. Augustine, Fla.

Dehorning from the Dairy Veterinarians' Viewpoint

As veterinarians we are dedicated, not only to the prevention of disease and the treatment of diseased of injured animals, but also to humane treatment of all animals that may come to our attention.

Just because 2 men can hold a 150-lb. calf down and apply a "red hot" iron to the horn buttons for a minute does not prove that it is justifiable or economically sound in this year of 1960. A dairy calf, after such treatment, is thrown into a state of shock which lasts from 2 to 6 hours or more, and who is to say that several days' gain in growth is not lost.

Dehorning animals with any instrument without the use of an anesthetic is not considered a humane practice.—*Pennsylvania Vet., 2, (Fall, 1960): 24.*

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Dr. H. W. Boothe Joins Armour Staff

Harry W. Boothe (OSU '44), has been appointed assistant veterinary technical director of Armour Pharmaceutical Company.

Dr. Boothe has been in small animal practice in Chicago since his graduation.

He is past president of the Chicago V.M.A. and a member of the AVMA and Illinois State V.M.A.

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1. Jones, S. V.; Belloff, G. B., and Roberts, H. D. B.: Vet. Med. 51:413 (Sept.) 1956.

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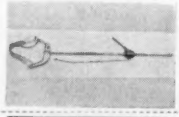

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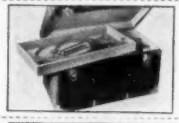

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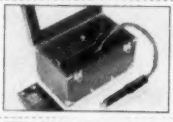

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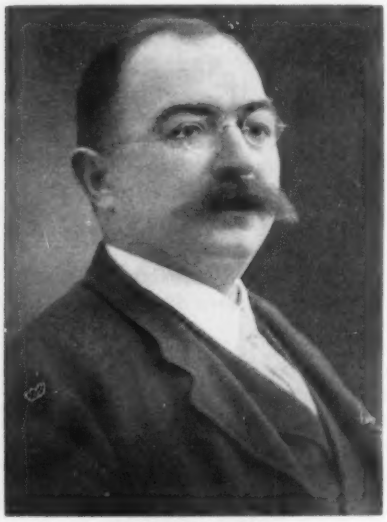
History of the AVMA

1903

The 40th annual meeting of the AVMA was held in Ottawa, Ontario, the first meeting of the Association on Canadian soil. "This," Sesco Stewart claimed in his presidential address, "should remove any doubts which Canadian veterinarians may have entertained as to the breadth of purpose of this organization."

Stewart notes that, as a result of the AVMA's raising its standard for membership, "A number of veterinary colleges raised their standards so that graduates would be eligible to membership, and this achieved a great gain for our profession. In 1897 the United States Bureau of Animal Industry established a like standard for eligibility to enter the veterinary service in the Department of Agriculture. So potent was the combined influence of these two regulations that practically all of the veterinary colleges of the continent have announced the three-year standard."



Dr. Roscoe R. Bell

The "sensation of the meeting" was D. E. Salmon's paper on "Bovine and Human Tuberculosis," giving the results of the Bureau's efforts to disprove Koch's contention that tuberculosis was non-transmissible between cattle and man. "The effect of Dr. Salmon's paper was electrical; every one seemed to realize that they had been particularly fortunate in being present to listen to the reading of a paper that effectually settled an important question of world-wide interest; that a new chapter in the history of medicine had been completed; that an international bomb had been exploded; and that they had been present when the lucifer was applied. . . . Cheer after cheer leaped from the throats of the guests, and the essayist was applauded to the echo. . . . There was no discussion—just praise."

Salmon's paper was part of the program which was conducted in the magnificent barn on the farm of the Hon. W.C. Edwards, who spoke on the Bang system for eradication of tuberculosis.

Wm. Dougherty presented a plan for the "Mutual Benefit Society for Veterinarians. . . to afford pecuniary aid to sick or injured members, and also aid to their widows and orphans or legal heirs." Each time a member died, the membership was to be assessed at the initial rate, and "a sum of money equal to one assessment call of the entire membership, less 15%, shall be paid to the heirs." After considerable discussion, it was decided to poll the entire membership of about 470. At the following meeting Dr. Dougherty reported having discussed the matter with W.H. Hoskins. "He has grave doubts as to the success of the assessment plan."

Roscoe R. Bell was elected president, J.J. Repp and W.H. Lowe were re-elected secretary and treasurer, respectively.

✦ ✦ ✦

ROSCOE R. BELL, D.V.S., was born in Virginia, Aug. 16, 1858. After being graduated from Norwood College he became a staff member of the *Spirit of the Times* (N.Y.). He entered the American Veterinary College and was graduated with honors in 1887. The following year he became Professor of Materia Medica at A.V.C., and retained this position until failing health forced him to relinquish it in 1907. He died of Bright's disease on Feb. 8, 1908.

In 1896 Dr. Bell purchased an interest in the *American Veterinary Review* and became one of its editors. Upon Dr. Liautard's return to France in 1900, Dr. Bell became sole editor and, presumably, proprietor. Merillat and Campbell commented upon Dr. Bell's assumption of the junior editorship of the *Review*, ". . . there was immediate improvement in the publication. He supplied a technique and finesse that the senior editor did not possess."

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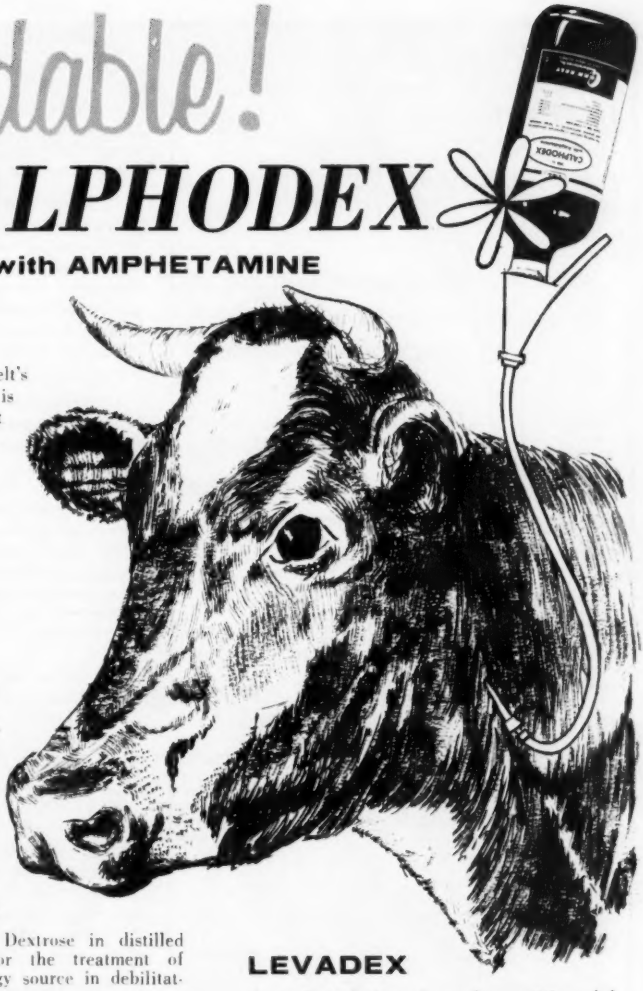

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Instructions to Authors

JOURNAL *of the AVMA*

1) *Exclusive Publication*: Articles submitted for publication in the JOURNAL of the AVMA are accepted with the understanding that they are not being offered for publication elsewhere.

2) *Manuscripts*, including footnotes, references, tables, and legends, must be typewritten, double-spaced, on 8½- by 11-inch bond paper, and the original and one carbon copy should be submitted. One-inch margins should be allowed on the sides with 2-inch margins at the top and bottom. Articles should be concise.

Purpose of the article should be stated in the introduction. Summary should be included.

3) *References* to published works should be brief and limited strictly to what is relevant to satisfactory exposition of the author's own work. Reference names are not permitted in the text of the article. Persons cited are to be referred to by superscript numbers only, relating to the reference list at the end of the article.

References should be typed double-space, in alphabetical order by author, as follows: author(s), title, periodical name, volume, year, and page(s).

[5]Mansson, J., and Obel, N.: The Technique of Adrenalectomy in the Ruminant. Cornell Vet., 48, (1958): 197-201.

When books are cited, name of publisher, location, edition, year of publication, and pages concerned should be given.

[1]Arey, L. B.: Developmental Anatomy. 5th ed. W. B. Saunders Co., Philadelphia, Pa. (1946): 236-240.

4) *Tradenames* of products are avoided in the text of the article. Use only generic or chemical names. The tradename may be included in a footnote along with name and location of producer (composition of product may be included if necessary): e.g., ". . . piperazine citrate* . . ." Footnote: *Piperol, Carson Chemicals, New Castle, Ind.

5) *Arabic numerals* should be used wherever digits are needed throughout the article except at the beginning of a sentence.

6) *Abbreviations* for weights and measures as given in standard dictionaries are usually acceptable, but some are determined by AVMA editorial preferences: e.g., Gm., gr., kg., cc., mg., cmm., Gm./kg., μg., mg./100 ml. Other abbreviations should be explained the first time they are mentioned either in parentheses or footnotes: e.g., ". . . pregnant mare's serum gonadotrophin (PMSG). . ."

7) *Photographs* should be furnished in glossy prints. Identifying arrows, letters, etc. within photographs should be clearly defined. All illustrations should bear the author's name, illustration number, and "top" side indication.

(Continued on adv. p. 40)

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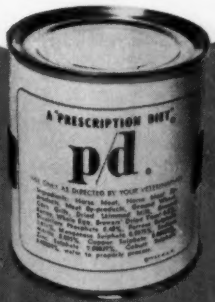

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1. What single drug proved most effective in counteracting deep anesthetization with pentobarbital? Page 131. What combination of drugs proved most effective? Page 135.

2. How did surgical intervention aid recovery of a dog from a persistent coughing syndrome? Page 139.

3. In one performance trial involving 579 secondary SPF pigs, what was the average 5 month weight? Page 145.

4. What influence do legumes containing estrogenic substances have on mastitis incidence? Page 149.

5. Can leptospirosis be transmitted by coition or artificial insemination? Page 152.

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Instructions to Authors—continued from adv. p. 38

8) *Drawings*, graphs, and charts should be clear and large enough to allow for possible reduction in size. A glossy print should be submitted if possible.

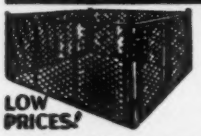
9) *Tables* should be simple and typed double-space. Complex tables are not acceptable. Complex material should be summarized rather than tabulated.

10) *Legends* should be typed double-space on a separate sheet.

Sufficient information should be included to allow the illustration to be understood without reference to the text.

Before submitting a manuscript, authors are urged to consult previous JOURNALS for appropriate style. The AVMA reserves the right to reject any manuscript.

PORTABLE DOG PENS



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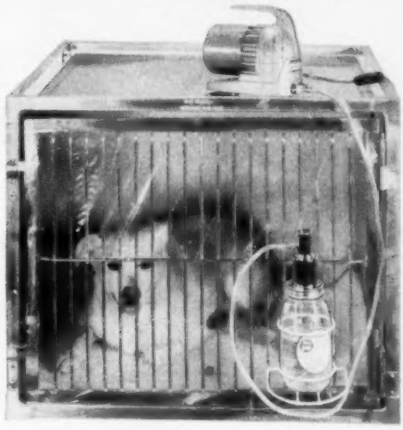

"Results secured warrant the continued use of this type of therapy," states the report on a study just completed by the College of Veterinary Medicine, Ohio State University.* Nebulization therapy was used on over 200 dogs suffering from; infectious and allergic trachea bronchitis, dry non-productive coughs, upper respiratory infections and irritative lesions following exposure to noxious substances. Treatment consisted of 1.), nebulization continuously for a period of 3 or 4 days or 2.), on an intermittent basis consisting of one hour of therapy once or twice daily for 3 to 5 days. Both methods proved satisfactory. Equipment used was a DeVilbiss No. 841 Nebulizer operated by a DeVilbiss No. 501 Air Compressor.

It is specifically designed to provide the largest volume of aerosol with optimum particle size, at lowest equipment cost. The compressor is conveniently portable (weighing only 8 pounds), quiet running to eliminate emotional disturbances of the animal, and yet produces more than sufficient air to insure quick results. The nebulizer produces an extremely fine mist and is filled with plain water. Where indicated, antibiotics may be added and mucolytic agents can also be added to the water to dislodge stubborn mucous secretions. The output of aerosol is variable and conveniently regulated at the nebulizer to provide a continuous mist for any period up to 64 hours without refilling—depending on the cage area or delivery rate desired. The rack offers universal conveniences for affixing to any standard cage.

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* Donovan, E. F. "Nebulization Therapy in Dogs." The Speculum. Vol. XIV, Fall 1960, No. 1.

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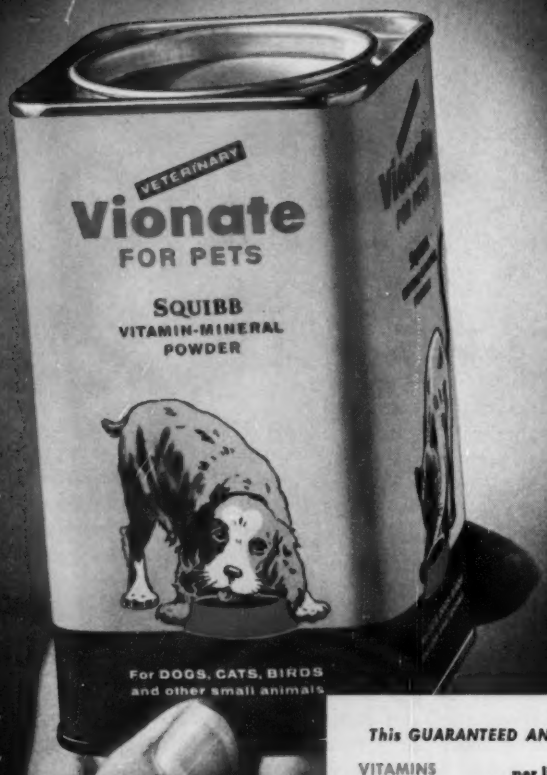

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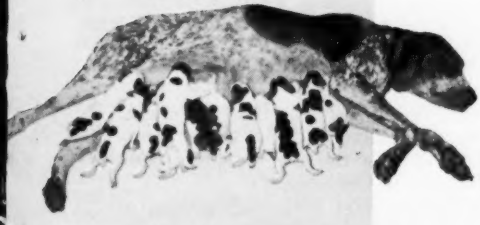

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Vionate for Pets is indicated to help prevent vitamin and mineral deficiency diseases in dogs, cats, birds and other small animals. Each ingredient fulfills a specific need in growth, health, vigor and reproduction. Vionate for Pets is particularly recommended for pregnant and lactating females to provide bone-building calcium and phosphorus in the proper ratio, plus ample vitamin D to assure thorough assimilation. Vionate for Pets is important for weanlings to provide vitamins and minerals needed for sound tooth and skeletal development, and for fur-bearing animals to promote prime quality pelts.

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The words "analysis" or "contents" on many supplement labels indicate only that the ingredients were present when the product was made. They offer no guarantee the ingredients will all be present when the product is bought. Vitamins are not uniformly stable. The *Guaranteed Analysis* on the Vionate for Pets label is your *proof of potency*.

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APPLICATIONS

Applicants Not Members of Constituent Associations

In accordance with paragraph (c) of Section 1, Article I, of the Bylaws, the names of applicants who are not members of constituent associations shall be published in the JOURNAL. Written comments received by the Executive Secretary from any active member regarding the application as published, will be furnished to the Judicial Council for its consideration prior to acceptance of the application.

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East Germans Give New Deal to Veterinarians

Communist East Germany has promised medical personnel better conditions in an attempt to stop their flight to the west. The drain on East Germany's medical services has endangered public health, western sources reported.

The West German Government announced recently that 2,054 doctors, 683 dentists, and 158 veterinarians have fled from the east in 2 years, along with nurses, chemists, and other trained medical technicians.

The new deal for East German medical men was announced Dec. 19, 1960, by the politburo, the Communist party's executive group. It amounted to a full retreat from the red policy of forcing all sections of public life into the communist pattern. In effect, the instruction to party officials was—let the doctors alone to run their professional lives. —*Assoc. Press, Dec. 20, 1960.*

Veterinarians and Wives Tour Europe

A group of 23 veterinarians and their wives, representing 13 states, recently visited veterinary colleges in seven European countries.

The trip included the National Veterinary College, Alfort, France; the College of Veterinary Medicine, University of Zurich, Ludwig-Maximillian University, Munich, Germany; and the Royal Veterinary College, University of London, England. Other countries visited during the trip were Switzerland, Holland, and Liechtenstein.

The group also met with leading men in the European veterinary field, including Dr. C. Formstron of the Royal Veterinary College and Dr. T. H. J. deMan of Amsterdam, the Netherlands. Various organizations hosted the group during the trip, including the Paris Veterinary Association.

The trip was organized by Research Laboratories, Inc., Saint Joseph, Mo.

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DOSAGE AND ECONOMY: Recommended treatment levels with new SULFABROM SOLUTION are 25-50 cc. per 100 lb. of body weight when injected intravenously and 50 cc. per 100 lb. of body weight when injected intraperitoneally. Cost of treatment per animal is remarkably low —only about 50¢ to $1.

RESULTS: The following remarks are abstracted from actual clinical investigation reports on the use of SULFABROM SOLUTION on file at the Merck Animal Science Research Department. (1) "*Symptoms:* Recently shipped-in cow. Temperature 106°. Labored breathing. Rales audible over chest area. *Diagnosis:* Pneumonia (shipping fever complex). *Treatment:* 700 cc. SULFABROM SOLUTION in one dose daily for two days. Sixty grams of SULFABROM BOLUSES given at time of I. V. injection. *Results:* Temperature returned to normal in 24 hours". (2) "*Symptoms:* Dystocia with removal by forced extraction of putrefied fetus. Temperature 104°. Rapid pulse and breathing. Anorexia. *Diagnosis:* Metritis. *Treatment:* Two doses SULFABROM SOLUTION 700 cc. each. *Results:* Temperature 101.6° in 24 hours. Appetite returning". (3) "*Symptoms:* Foul hoof—limited to 'between the toes' variety with swelling. *Diagnosis:* Foot rot. *Treatment:* 700 cc. SULFABROM SOLUTION. *Results:* Eight of 11 animals walked normally in 48 hours with swelling reduced to normal or near normal. Three animals required second treatment and returned to normal in 48 hours".

These quoted reports are typical of those being received from clinical investigators and veterinarians. We believe they demonstrate that *the only sulfas available to you exclusively*—new SULFABROM SOLUTION and SULFABROM BOLUSES—are also the most effective you can use.

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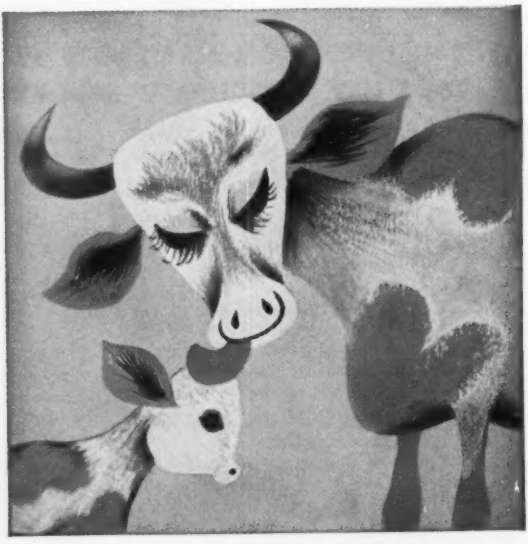

a simple 2-step method with

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BRAND OF NITROFURAZONE

Solution Veterinary SQUEEJET® and Suppositories Vetertnary

- **reduces services per conception**
- **shortens intervals between calvings**

Impaired fertility in cows, commonly accepted to result from non-specific genital infection, responds dramatically to the 2-step treatment method with FURACIN. In one 3-year study involving treatment with FURACIN Suppositories Veterinary, of approximately one-half of 530 "problem breeders": "The average number of services per conception was 1.88 in the treated and 2.85 in the untreated cows. The average number of days between calvings was 385 in the treated and 447 in the untreated animals."[1]

In a study with 85 subfertile dairy cows, 61.7% of 34 treated with an intra-uterine injection of FURACIN Solution Veterinary conceived at first service, while only 19.3% of 31 treated in an identical manner with 10% saline solution conceived at first service; 40% of 20 non-treated controls conceived at first service.[2]

FURACIN 2-Step Method for Impaired Fertility

STEP 1. During estrus, instill, aseptically, the contents of 1 to 3 SQUEEJETS (30 to 90 cc.) of FURACIN Solution Veterinary into the uterus by means of a uterine pipette.

STEP 2. During the following 3 weeks, insert 1 FURACIN Suppository Veterinary into the anterior portion of the vagina 3 times each week on alternate days.

The cow may then be bred during the next estrus.

Supply: FURACIN Solution Veterinary SQUEEJET (30 cc. each), boxes of 12; FURACIN Suppositories Veterinary, boxes of 12.

1. Vigue, R. F., et al.: J. Am. Vet. M. Ass. 134:308 (April 1) 1959.
2. Vigue, R. F.: Personal communication.

EATON LABORATORIES, Division of The Norwich Pharmacal Company, NORWICH, NEW YORK

Coming Meetings

Notices of coming meetings must be received 30 days before date of publication.

February, 1961

Ohio State Veterinary Medical Association. Annual meeting. Commodore Perry Hotel, Toledo, Ohio, Feb. 5-8, 1961. Dr. R. E. Rebrassier, 1411 West Third Ave., Columbus 12, Ohio, executive secretary.

Sierra Veterinary Medical Association. Second annual meeting. Mammoth Mountain Inn, Mammoth Lakes, Calif., Feb. 12-17, 1961. Dr. John R. Puckett, 13476 Washington Blvd., Venice, Calif., president.

Missouri Veterinary Medical Association. Sixty-ninth annual meeting. Hotel Statler-Hilton, St. Louis, Mo., Feb. 19-21, 1961. Paul L. Spencer, D.V.M., P.O. Box 283, Jefferson City, Mo., secretary.

Illinois State Veterinary Medical Association. Annual meeting. LaSalle Hotel, Chicago, Ill., Feb. 20-22, 1961. Dr. C. B. Hostetler, 1385 Whitcomb Avenue, Des Plaines, Illinois, executive secretary.

Manitoba Veterinary Medical Association. Winnipeg, Manitoba, Feb. 27-28, 1961. Dr. K. Warren, Killorney, Manitoba, secretary.

March, 1961

Alabama Veterinary Medical Association. Annual meeting. Whitley Hotel, Montgomery, Ala., March 19-21, 1961. Dr. M. K. Heath, School of Veterinary Medicine, Auburn, Ala., secretary.

April, 1961

Animal Health Institute. 21st annual meeting. Mayflower Hotel, Washington, D.C., April 24-26, 1961. Dr. Guy A. Railsback, Cutter Laboratories, 4th & Parker Sts., Berkeley 10, Calif., president.

Southwestern Conference on Diseases in Nature Transmissible to Man. Eleventh annual conference Agricultural and Mechanical College of Texas, Memorial Student Center, College Station, Texas, April 27-28, 1961. Dr. F. P. Jaggi, Jr., Department of Veterinary Public Health, Agricultural and Mechanical College of Texas, College Station, Texas, conference chairman.

Continued on adv. p. 50.

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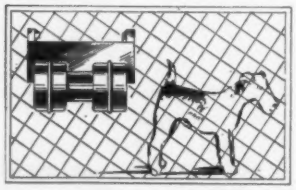

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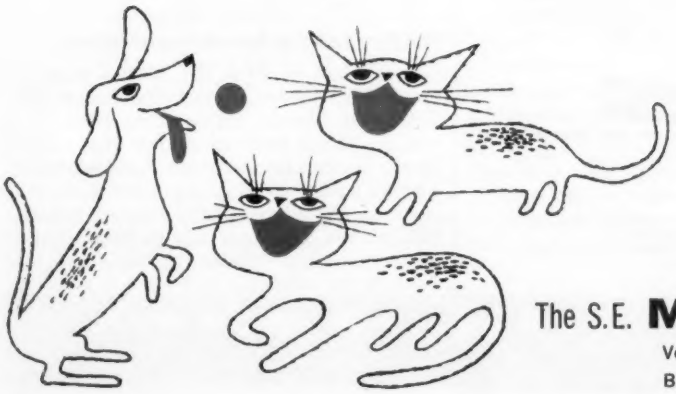

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Coming Meetings—continued from adv. p. 48

June, 1961

Pennsylvania Veterinary Medical Association. Annual convention. Pennsylvania State University, State College, Pa., June 13-15, 1961. Dr. Richard C. Guise, 5399 Jonestown Rd., Harrisburg, Pa., president.

Maritime Veterinary Associations. Twelfth annual joint conference. Mount Allison University, Sackville, N.B., June 27-29, 1961. Dr. R. McG. Archibald, P. O. Box 310, Sackville, N.B., Can.

Nebraska, University of. Swine Repopulation Conference. Veterinary Science Department, University of Nebraska, Lincoln, Neb., June 28-29, 1961. Dr. Crosby Howe, Department of Veterinary Science, University of Nebraska, Agricultural Experiment Station, Lincoln 3, Neb., chairman.

August, 1961

American Veterinary Medical Association. Ninety-eighth annual meeting. Sheraton-Cadillac Hotel, Detroit, Mich., Aug. 21-24, 1961. Dr. H. E. Kingman, Jr., 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

Foreign Meetings

Fourth International Congress on Animal Reproduction. The Hague, Netherlands, June 5-9, 1961. For additional information contact: the Secretariat of the Fourth International Congress on Animal Reproduction, 14, Burgemeester de Monchyplein, The Hague, Netherlands, Dr. L. Hoedemaker, secretary to the organizing committee.

Eighth International Congress of Animal Husbandry. Hamburg, Germany, June 13, 1961.

Twelfth World's Poultry Congress. Show Grounds of the New South Wales Royal Agricultural Society, Sydney, Australia, Aug. 13-18, 1962. Dr. Cliff D. Carpenter, chairman, U.S. Participation Committee, 1207 Emerald Bay, Laguna Beach, Calif.; Dr. A. William Jasper, secretary, c/o AFBF, 2300 Merchandise Mart, Chicago 54, Ill.

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In dogdom in 1960, the Poodle unseated the Beagle, ruler of the dog world since 1955. This year, Beagle registrations have been running 12 per cent behind last year's while Poodle listings have jumped 11 per cent. According to last official figures for AKC registration, there were 53,945 Poodles and 41,038 Beagles. The rapid rise in Poodle popularity probably relates to the fact that Poodles are available in 3 sizes, toy, miniature, and standard, permitting adaptability to almost any size dwelling and family.—*Quaker Oats Co. Release, Chicago, Ill., Dec. 5, 1960.*

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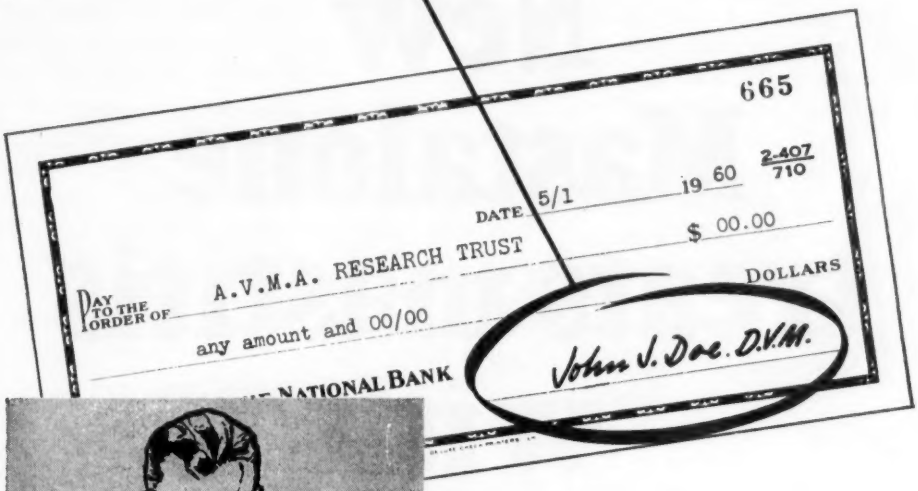

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Reduces inflammation with prednisolone, which is three times as effective as hydrocortisone

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- 5 mg. of prednisolone (Sterane®).
- Special base, Q. S.

Warning: Milk taken from dairy animals within 72 hours after treatment for mastitis should not be used for food.

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A large animal practitioner who has made FURACIN his primary antimastitis agent, summarizes its principal advantages:

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Improved intramammary dosage form of FURACIN in a convenient, low-cost single-dose, ready-to-use dispenser.

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Available in SQUEEJETS of 30 cc., boxes of 12.

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Note: Milk from cows treated with FURACIN-penicillin Gel should be discarded or used for purposes other than human consumption for at least 72 hours after the last treatment.

References: 1. Kakavas, J. C.; Roberts, H. D. B.; deCourcy, S. J., and Ewing, D. L.: J. Am. Vet. M. Ass. 119:203 (Sept.) 1951. 2. Kakavas, J. C.: Antibiotics Annual 1954-1955, New York, Medical Encyclopedia, Inc., 1955, p. 323. 3. Jackson, R. A.: A Program for Mastitis Control. Read at the Second Regional Conference on the Nitrofurans in Veterinary Medicine, Madison, Wisconsin, May 28, 1959, pp. 23-26.

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*Lawson, K. F., *et al.*: Canad. J. Comp. Med.: *22*:164, 1958.

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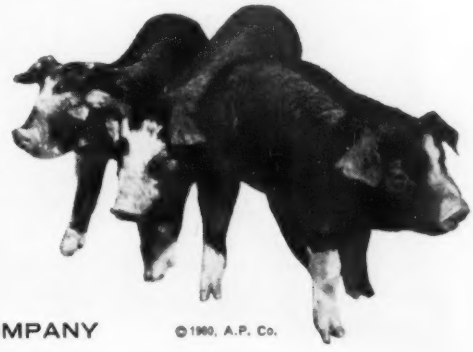

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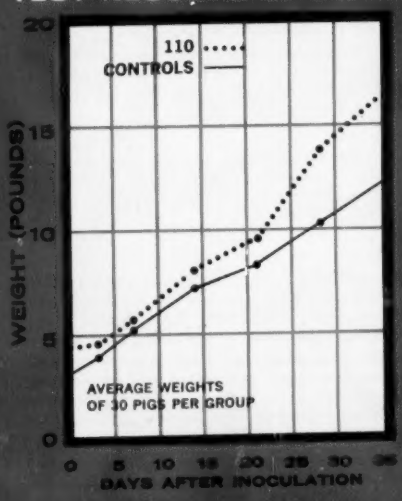

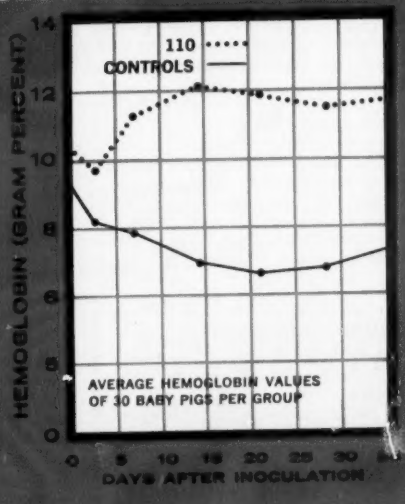

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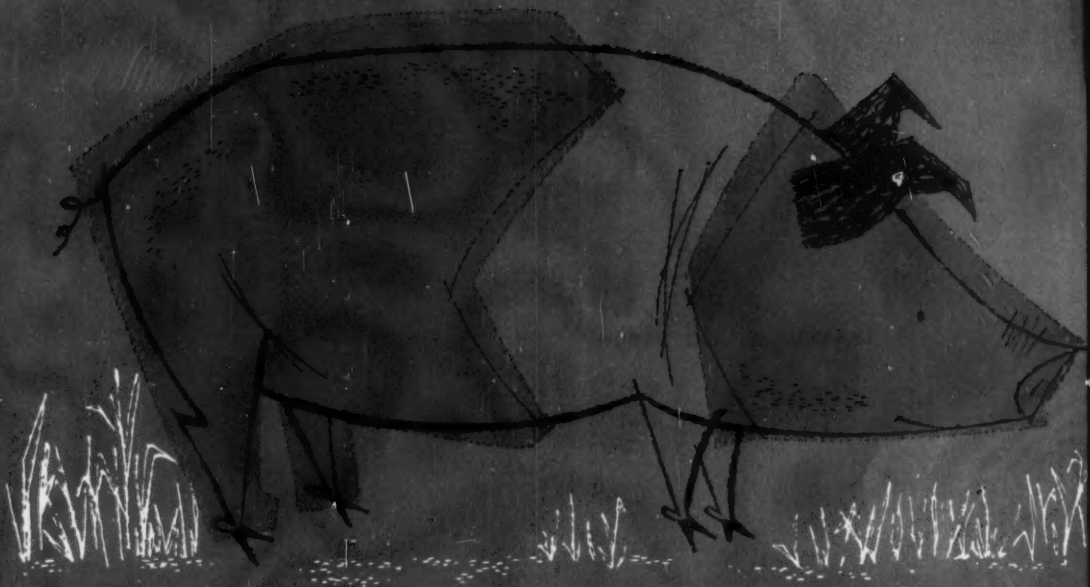

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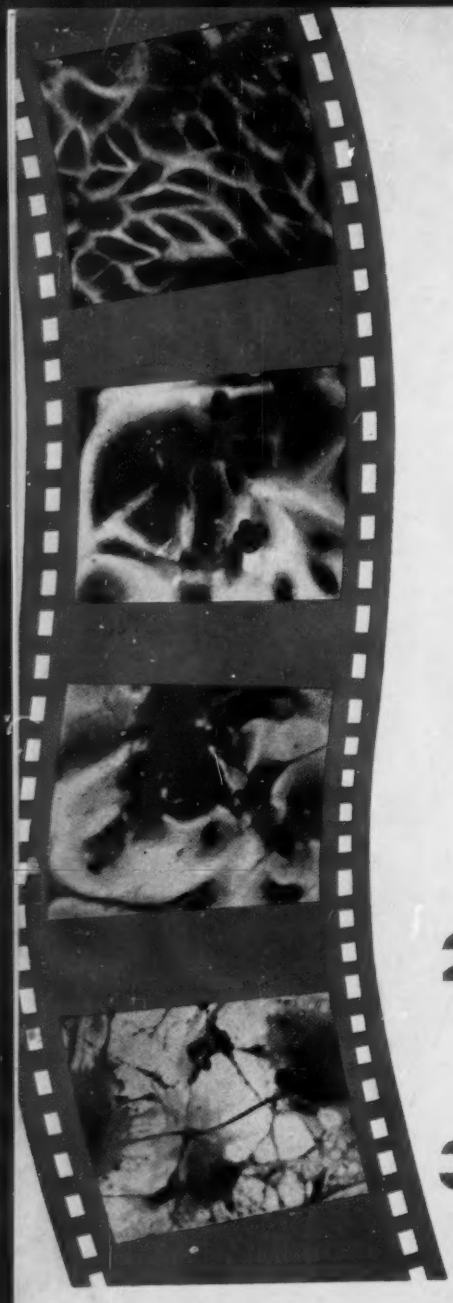

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1. Sinha, S. K., et al, Studies on Canine Distemper Immunization with a Tissue Culture Vaccine. Vet. Med., Vol. 55, No. 4, April 1960.
2. Burgher, J. A., et al, The Immune Response of Dogs to Distemper. Cornell Vet., Vol. 48, No. 2, 1958.
3. Paton, I. M., et al, Progress in Distemper Immunization. Jen-Sal Small Animal Topics, August 1960.
4. Dept. of Biological Research, Jensen-Salsbery Laboratories. Unpublished Research Data.

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